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CONTENTS.

THE WHOLE OF THE LITERARY MATTER IN THE LANCET IS COPYRIGHT.

THE ARRIS AND GALE LECTURE on New Researches in Colour-Vision. By F. W. EDRIDGE-GREEN, C.B.E., M.D.—(*Illustrated*) 357

SOME POINTS on Spasm in the Alimentary Tract. By G. DE BEC FURTLE, M.D.—(*Illustrated*) 361

ORIGINAL ARTICLES.

Gamma Rays and Malignant Disease. By REGINALD MORTON, M.D., C.M., F.R.C.S.—(*Illustrated*) .. 364

Deep X Ray Treatment of Cancer: A Personal Impression of the Erlangen Frauenklinik. By H. KINGSLEY WARD, *M.C.*, M.B. 366

A Case of Sclerema Neonatorum. By ELEANOR BOURNE, M.B., Ch.M... 368

The Application of the Methods of Correlation to the Study of the Urine. By CHARLES POWELL WHITE, M.D., F.R.C.S... 369

Medical Life in a French Colony. By ALFRED S. GUBB, M.D., M.R.C.S... 397

Cause, Condition, and Constellation in Medicine. By H. A. BOSMA, M.D... 410

CLINICAL NOTES:

MEDICAL, SURGICAL, OBSTETRICAL, AND THERAPEUTICAL.

An Unusual Accident During Appendicectomy. By Major F. J. W. PORTER, D.S.O., M.R.C.S. 371

Case of Puerperal Septicæmia; Recovery. By J. HARGREAVES ROBINSON, L.A.H., L.M.R.C.P. —(*Illustrated*)..... 371

MEDICAL SOCIETIES.

Royal Society of Medicine: Clinical Section..... 372

Society of M.O.H. 373

West London Medico-Chirurgical Society..... 374

South-West London Medical Society 375

London Association of the Med. Women's Federation 375

Liverpool Med. Institution 375

Bristol Med.-Chir. Soc. .. 376

West Kent Med.-Chir. Soc. 376

Sheffield Med.-Chir. Soc.. 377

Royal Med.-Chir. Soc. of Glasgow 377

REVIEWS AND NOTICES OF BOOKS.

South America from a Surgeon's Point of View. By Franklin H. Martin, C.M.G., M.D. 378

Methoden zur Untersuchung des Licht- und Farbensinnes sowie des Pupillenspieles. By Carl v. Hess 378

A Manual of Practical Anatomy. By Prof. Thomas Walmsley. Part II.: The Thorax and Abdomen 379

Traité de Pathologie Médicale et de Thérapeutique Appliquée. Vol. XI. Appareil Digestif. By Jean-Charles Roux and others 379

The Practitioner's Encyclopædia of Midwifery and the Diseases of Women. Edited by John S. Fairbairn, B.Ch., F.R.C.P., F.R.C.S..... 379

Thérapeutique Gynécologique. Second edition. Par Prof. P. Guéniot.... 380

Synopsis of Midwifery. Second edition. By Alec W. Bourne, B.A., M.B.. . 380

Practical Medicine Series. Vol. II.: General Surgery. Edited by A. Ochsner, M.D. Vol. III.: The Ear. Edited by C. A. Wood, M.D. The Nose and Throat. Edited by G. E. Shambaugh, M.D. 380

Botany. By F. E. Fritch, D.Sc.; and E. J. Salisbury, D.Sc. 380

Journal of Pathology and Bacteriology..... 380

Annals of Medical History 381

REPORTS AND ANALYTICAL RECORDS.

Glucarsenol-"C."—Valentine's Meat-Juice.—Manna Bread.—Normandin's Invalid Cognac. —Ambriodin (Centaur).. 382

LEADING ARTICLES.

GRANTS-IN-AID OF HEALTH 383

CONSTELLATIONS IN MEDICINE 384

VENEREAL DISEASE AND CONTINUOUS TREATMENT 384

ANNOTATIONS.

The Biological Action of Light 385

Farr's Law 385

Foot-and-Mouth Disease.. 386

Medical Evidence at Inquests 386

The Growth of the Human Face 386

Mercury Inhalations in Syphilis 387

Asylum Administration: The Divided Control.... 387

"On the Edge of the Primæval Forest" ... 388

Twenty Years of Antirabies Inoculation..... 388

Economy and Residential Treatment for Tuberculosis 389

Health and Industrial Output 389

Public Health and the City of London 390

A Diploma in Tuberculosis 390

The Fellowship of Medicine 390

Carbon Tetrachloride in Ankylostomiasis 391

SPECIAL ARTICLES.

Economy in Health Administration.—(*Concluded*) .. 391

The Seventeen Salvarsan Commandments of the German Reichsgesundheitsrat 393

Tuberculosis 395

Notes from India..... 396

THE SERVICES.

Royal Army Medical College. —Royal Army Medical Corps.—Royal Air Force.—India and the Indian Medical Service. —Deaths in the Services 398

CORRESPONDENCE.

Parliamentary Representation of Medicine (Capt. Walter Elliot, M.P.).... 399

Venereal Disease Prevention: The Two Camps (Mr. H. Wansey Bayly) 399

Control of Venereal Disease: The Campaign in Germany (Mrs. C. Neville Rolfe) 399

Kala-Azar and the Bed Bug (Dr. C. M. Wenyon).... 400

The Treatment of Gastric Ulcer (Dr. Henry Menzies, Mr. E. G. Slesinger).... 402

Lunacy Administration (Dr. John R. Lord)..... 402

British Medical Practitioners in China (Sir Alfred Pearce Gould) .. 402

Alpine Treatment of Tuberculosis (Dr. Felix Savy). 403

The Education of the Deaf (Dr. James Kerr Love).. 403

Amaas or Alnstrim? (Dr. J. Fehrsen) 403

Modification of the Lantern for Lectures (Prof. W. S. Lazarus-Barlow) 404

Cancer Research at King's College, London (Prof. W. J. Simpson)..... 404

A Disclaimer (Dr. E. W. Ainley Walker)..... 404

Rupture of the Rectus Abdominis Muscle in Influenza (Dr. J. A. Nixon) 404

German X Ray Apparatus 405

Scientific Pig-keeping (Mr. S. F. Edge)..... 414

PARLIAMENTARY INTELLIGENCE.

House of Commons: Removal of Shepherd's Bush Orthopædic Hospital.—Lunatic Asylum Administration.—Food and Milk for Expectant Mothers.—Trained Nurses and Unemployment.—Life Pensioners and Medical Boards .. 405

MEDICAL NEWS.

Univ. of Bristol: Pass-list.. 406

Literary Intelligence..... 371

Tuberculosis Society..... 377

Mental After Care Assoc... 377

Welsh National School of Medicine Appeal..... 391

Aberdeen Royal Infirmary.. 398

Psychological Medicine and Juvenile Crime..... 406

Royal Institution 407

South-Western Ophthalmological Society..... 407

The late Dr. George Banks 407

Donations and Bequests.. 407

The late Dr. T. C. Hynd.. 407

The late Dr. Duncan Carmichael 407

Sussex Throat and Ear Hospital 407

Lord Mayor Treloar Cripples Hospital 407

The King's Services Choirs 407

Staffing of a Poor-law Infirmary 407

St. Andrew's Hospital, Dollis Hill 408

The late Dr. William Craig 408

Annett v. Evans Sons Lescher and Webb, Ltd. 408

NOTES, SHORT COMMENTS, &c.

The Surgery of the Blood.. 412

Application of Heat and Cold to the Hands..... 413

Public Health in Egypt... 413

Public Health in Penang.. 414

Apparatus for X Ray Therapy 414

Appointments.—Vacancies. 408

Medical Diary 409

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There is no universally recognised standard of rejection for colour-blindness since the wool test has become obsolete. With the wool test anyone found to show any evidence of colour-blindness was rejected. The wool test allows 50 per cent. of dangerously colour-blind to pass and of those rejected 50 per cent. are not dangerously colour-blind. The nautical advisers of the Board of Trade are agreed that anyone who can distinguish between the red, green, and white lights at a distance of a mile has sufficiently good colour perception for the purpose of navigation at sea. The point, therefore, for consideration is the degree of defective colour perception corresponding to a failure to distinguish between the red, green, and white lights used at sea at a distance of a mile.

About 25 per cent. of men have diminished colour perception in comparison with the remaining 75 per cent. As these cases form a complete series from total colour-blindness to super-normal colour perception the consideration is where the dividing line should be drawn and whether there is some special fact which will indicate the limit of safety. About 5 per cent. of men will fail to distinguish between the red, green, and white lights of a properly constructed lantern or with the actual lights themselves at a distance of a mile. These men will equally fail with other properly constructed tests as, for instance, my spectrometer or card test. An examination with the spectrometer shows that they may be ranged in three definite classes: the dichromic, who see only two colours in the spectrum, red and violet, with a neutral division between them; the trichromic, who see only three colours in the spectrum, red, green, and violet, and who designate the yellow of the spectrum as red-green; and those who have shortening of the red end of the spectrum. The spectrometer is the most convincing test in these cases, for instance, the trichromic will isolate a considerable portion of the yellow region of the spectrum containing to the normal sighted orange-yellow, yellow and yellow-green and will state that it is one uniform band of colour.

A person of very acute colour-vision can distinguish seven colours in the solar spectrum—red, orange, yellow, green, blue, indigo, and violet. Those who have for all practical purposes normal colour-vision see six, five, or four colours, those who see six failing to distinguish indigo, those who see five, orange as well, and those who see four, blue in addition. Those who can distinguish seven colours are called heptachromic and those of less acute perception in descending order, hexa-, penta-, tetra-, tri-, and dichromic. The tetrachromic, or those who see four colours in the spectrum, red, yellow, green, and violet, though in continual difficulty about blue and green, have a definite yellow sensation, and repeated and extended examinations with actual lights extending in some cases over five hours have convinced me that for practical purposes the tetrachromic are not dangerous. The possession of a definite yellow sensation is therefore the deciding point for passing as practically normal.

The lantern is therefore an efficient test; cases of acquired colour-blindness—as, for instance, those with central colour scotoma—are also excluded, as well as those due to defective light perception, such as shortening of the red end of the spectrum. It will be noticed that this standard is based only on facts. According to my experiments this standard is safe for a greater distance than a mile and will tend to diminish and not increase the number of candidates rejected.

THE IMPORTANCE OF COLOUR NAMES IN A TEST FOR COLOUR-BLINDNESS.

It is necessary to emphasise again the fundamental importance of colour names in any test for colour-blindness. There is no point in colour-vision on which general opinion has so completely changed. There are, however, some who, whilst admitting that colour names must be used in a practical test, do not recognise their value in a purely scientific test. The importance of colour names in a practical test is obvious in the case of a man who confuses the red, green, and white lights of the lantern by calling red green or green red or white either green or red or by frankly confessing that it would be only guessing on his part to try to distinguish between two or more of them. Even with my new Card Test, which consists of reading pseudo-isochromatic letters, the test is not complete until the chief colours have been correctly named, on account of the many varieties of defective colour-vision which exist. Colour names are of equal importance in other methods of testing—for instance, the observer being shown a combination of spectral colours to match white. The mixed colour may contain a considerable excess of green and the colours on the two screens appear white and bright green respectively to the normal-sighted. The observer is asked to name the colours shown. If colour-blind he may say white and red; he is then told to say when all the red disappears from the mixed colour and the two match exactly. Still more green is added to the mixed colour until the observer states that both are exactly alike.

When my spectrometer is used colour names are equally important, as, for instance, when the observer is asked to pick out pure yellow and isolates a strip of green, red, or several colours. The spectrometer is the most convincing test of all from the point of view of the public. Cases have occurred where a parent has wished to stop the examination, remarking that anything further was unnecessary and has said, "I thought before that my son was guessing or nervous, but when you showed him that little rainbow (red, orange, yellow, and green being shown) and he called it red I knew that he must be colour-blind."

THE WHITE EQUATION.

The fact that when two or three simple spectral colours are combined a white is produced which matches that from which the spectrum has been formed is the basis of many theories of colour-vision. The fact is therefore of fundamental importance to any theory of colour-vision.

In a recent paper[1] it was pointed out that when an exact match of red of λ 6670–6770 Å, a green of λ 5144–5156 Å and a violet of λ 4250–4267 Å with white was made, after fatigue with red light in the region of λ 670 $\mu\mu$ there was no longer a match between the simple and mixed whites, the mixed white appearing bright green, and in order that a match could be made the green had to be reduced to about one-half of the amount required by an unfatigued eye. It is therefore obvious that the underlying physiological processes are not the same with the mixed and simple whites. It should be noted, however, that no change in the equation is seen when the eye is fatigued with red light in the region of λ 780 $\mu\mu$.

[1] Proceedings of the Royal Society, 1921, B, vol. xcii., p. 232.

Another fact of colour fatigue bears on this point; red of λ 670 μμ can be matched with red of the end of the spectrum by varying the intensity and so it has been stated that red λ 670 μμ, as well as the terminal red, only affects the hypothetical red sensation. If, however, the eye be fatigued with red of the region of λ 760 μμ and red of the region λ 670 μμ be subsequently viewed, this appears yellow or even greenish-yellow, which could not be the case if the red sensation only had been affected.

CHANGE OF HUE PRODUCED BY ADDITION OF WHITE LIGHT TO SPECTRAL COLOURS.

White light is a purely relative term; the white light of the sun is not the same as that from an artificial source, and the term is therefore employed as meaning the combined light of the source which is used. In making the experiments described the light was that of a 1000 candle-power Tantalum arc which, compared to sunlight, is yellow. The apparatus used in these experiments has already been described.[1]

Various spectral colours were isolated on a screen coated with magnesium oxide, and definite proportions of white light, taken from the source, added. The scale of white light is arbitrary; the maximum amount of light it is possible to add being 100 divisions. A comparison white light taken from the source was used. Each colour became less saturated on adding white light. Red first became orange, then yellow. Orange became yellower, λ 585 μμ, pure yellow did not change in hue. Orange-yellow and yellow-green became yellow. Green became yellow-green. Blue λ 480 μμ became white, the comparison white appearing yellow. The violet end of the spectrum from λ 480 μμ making a blue on the screen, changed to violet on adding 33 divisions of white light, light purple on adding 100 divisions. Wave-length 585 μμ, the point where the addition of white light produces no change of hue is also the centre point of pure yellow and the apex of the luminosity curve. The results of these experiments show that the component part of white light which has the greatest luminosity effect is the hue to which all colours tend on the addition of white light.

THE ANOMALOUS WHITE EQUATION WITHOUT COLOUR-BLINDNESS.

Just as a man may make an anomalous Rayleigh equation without any evidence of colour-blindness,[2] so may a man make an anomalous white equation without being colour-blind. As an example of this a man was examined who presented no sign of colour weakness. He passed my card test, lantern test, and spectrometer with the ease and accuracy of an absolutely normal-sighted person. His luminosity curve was taken by the flicker method and corresponded with the normal. The wave-length of the apex of the luminosity curve was at 585 μμ, which is the normal point. When, however, his white equation was taken he put only 8 scale divisions of green, instead of 13½ or 14, which is normal, and the mixed light appeared red to the normal-sighted. An important fact was noted—namely, that after fatigue with red of the region of λ 670 μμ the equation changed to him in the same way as the normal-sighted. After fatigue with the red light he required only 4 scale divisions instead of 8. It is quite obvious that this was not a case of partial red-blindness.

THE WHITE EQUATION AND COLOUR-BLINDNESS.

The colour-blind have been classified by some as red- or green-blind in accordance with their white equations, those who put too much red in the equation being classed as red-blind, and those who put too much green in the equation being classed as green-blind. There are, however, many who, whilst agreeing with the normal equation, are quite satisfied when a considerable additional amount of green or red is added to the equation. This explains why in certain cases some have been described as red-blind by one observer and green-blind by another.

[1] Ibid., 1913, B, vol. lxxxvi., p. 164.

A remarkable fact, which does not seem to have been previously observed, is that many colour-blind persons who strongly object to the normal match, but are satisfied with an anomalous equation, will completely agree with the normal equation when the comparison white light is increased in intensity so that it is much too bright to a normal-sighted person. This clearly shows that the normal mixed white produces the same effect as far as colour is concerned, but has a more powerful effect as to luminosity. This is in complete accordance with other observations and is found in those cases in which there is abrupt and slight shortening of the red end of the spectrum. If there be shortening of the red end of the spectrum which does not affect λ 670 μμ and λ 670 μμ has its normal light value, the mixed light will be more luminous than the simple white in the exact proportion of the shortening. This portion of red light not producing any effect has to be subtracted from the white light. These facts are quite inconsistent with a hypothetical red sensation which is affected by light of all wave-lengths. Another illustration may make this point clear. A man with shortening of the red end of the spectrum and normal colour discrimination will put together as exactly alike a pink and a blue or violet much darker. If, however, the pink and blue be viewed by a normal-sighted person through a blue-green glass which cuts off the red end of the spectrum both will appear identical in hue and colour. This proves conclusively that the defect is not due to a diminution of a hypothetical red sensation, because all the rays coming through the blue-green glass are supposed to affect the red sensation, and yet we have been able to correct the erroneous match by the subtraction of red light. On the other hand, there are colour-blind persons who, whilst disagreeing with the normal white equation, agree with it when the comparison white is diminished in intensity.

COMPLEMENTARY COLOURS AND COLOUR MIXING.

Any two spectral colours which when mixed in certain proportions give the sensation of white are complementary to each other. Unfortunately, there is no standard white, daylight being variable according to the time of the day, and daylight is much bluer than light from an artificial source, as, for instance, gas light or electric light. It is therefore absolutely necessary that a comparison white light should be used in experiments in colour mixing and complementary colours. Without a comparison white an erroneous impression is likely to be made. For instance, when white light of the Tantalum arc from which the spectrum is formed is added to different spectral colours the hue is changed as if yellow of λ 585 μμ had been added as well. Now if pure blue be thrown on the surface of the cube, and white light added, the colour appears less and less blue until it appears to have become actually yellow. If, however, a surface which is illuminated only by white light is used for purpose of comparison, the white light appears yellow by contrast, showing that the blue mixed with white is really a bluish white, though no trace of blue is evident in its appearance.

The complementary has been considered to be a function of wave-length and the tables of complementaries and changes produced by colour mixing which are almost universally given are those of Helmholtz and are quoted in my new book.[3] It will be seen that there is a region, extending from about λ 560 μμ to λ 492 μμ, of which it is stated that a simple complementary is not to be found within the spectrum, two spectral colours being required instead of one. In the following experiments the apparatus used was that already referred to as described in the Proceedings of the Royal Society. The screens are viewed at a distance of 12 in.; one screen is illuminated by spectral colours of known wave-length, the other by a 1000 candle-power Tantalum arc light which is used as the source of the spectrum. The amount of light falling on this screen is regulated by an aperture recorded by an

[3] The Physiology of Vision, G. Bell and Sons, 1920, p. 138.

arbitrary scale, a hundred divisions of the scale being the maximum amount of white light which can be added. There has been much discussion as to the influence of the pigment of the yellow spot on colour matches, and for this reason matches have been made so that images only fall on the fovea. This, however, does not appear to be necessary if the centre of the dividing line between the two colours to be matched be viewed. The central portion of each is viewed with the fovea, and better discrimination is made on account of the larger surface and corresponding visual angle.

The normal white equation is 36 red λ 6670 − λ 6770 Å + 13 green λ 5144 − λ 5156 Å + 42 violet λ 4250 − λ 4267 Å, though the proportions vary slightly with different normal-sighted persons. This match, although correct at 4 ft., is not correct when viewed from a distance of 12 in.; the mixed white then looks bluish. If the slit allowing violet light to pass be completely closed a better match is made, but the mixture of the red and green still appears bluish, and in order that white may be made the slit has to be shifted to λ 520 μμ, the pure green. A white can be made with λ 670 μμ red and green from λ 520 μμ to λ 540 μμ. This is the monochromatic region of pure green. Pure green and pure red are therefore, in these circumstances, complementary to each other. This is in accordance with my earlier observations with spectral colours in which I could not obtain a true white with red and blue-green, a purplish white was produced.[4]

When the white equation given above is viewed at a distance of 4 ft. the slit allowing violet light to pass may be completely closed without making much difference in the appearance of the equation; a small amount more green is required to make it exact.

The following when mixed together match a white of the Tantalum arc when viewed at a distance of one foot:—

λ 700 μμ − λ 620 μμ and λ 540 μμ − λ 520 μμ.

By varying the luminosity any portion of red from λ 700 μμ to λ 640 μμ can be made to match any other portion. Colour value appears only to depend upon the luminosity of red used. This is shown very clearly when the complementaries are added to make white.

Slit width.	λ in μμ.		Slit width.	λ in μμ.		Luminosity of white matched.
40	680	+	2	540	=	11·6
21	670	+	2	540	=	11·6
12	660	+	2	540	=	11·6
6	650	+	2	540	=	11·6
4	640	+	2	540	=	11·6
2	630	+	2	540	=	11·1
1·5	620	+	2	540	=	10·5

This is reproduced as a curve in Fig. 1, the abscissæ being wave-lengths in μμ, the ordinates the amount of red light which added to two scale divisions of green light λ 540 μμ make white. It will be noticed that when red from λ 680 μμ to λ 640 μμ is used the amount of white matched is the same in every case—namely, 11·6. This corresponds with the monochromatic region of red taken with my spectrometer, which with normal-sighted persons extends from the red end of the spectrum to about λ 633 μμ. These facts are strong presumptive evidence that the exciting process is physiologically the same in each case. When λ 630 μμ is reached the red required to make a white is less, the matched white being 11·1 and at λ 620 μμ 10·5. This indicates that either the red value is higher or another element has come in. With orange-red of λ 610 μμ and green λ 540 μμ it is not possible to make a white; the nearest approach is too yellow. A white can, however, be made with λ 610 μμ and green of λ 530 μμ and also with λ 520 μμ. A match with λ 515 μμ is not possible; the nearest mixture appears too blue. Orange λ 600 μμ makes a white with green λ 515 μμ to λ 495 μμ but not at λ 520 μμ. Orange-yellow λ 590 μμ makes a white with blue-green λ 510 μμ, λ 500 μμ to λ 490 μμ. Pure yellow λ 585 μμ makes a white with pure blue λ 485 μμ. λ 585 μμ is the apex of the luminosity curve. Yellow λ 580 μμ makes a white with blue λ 480 μμ. Greenish-yellow λ 577 μμ and λ 576 μμ make a white with violet λ 445 μμ to the termination of the violet end of the spectrum. It will be noticed that at λ 630 μμ equal slit widths of it and λ 540 μμ are required to make white. This is also the case with λ 633 μμ. Though the light varies slightly with the electric current these proportions were always found on repeating the match. On increasing the luminosity they still remained.

Red 2·5 λ 633 μμ + Green 2·5 λ 540 μμ = 10
" 5 " " 5 " = 14·14 } W.s.d.
" 10 " " 10 " = 20

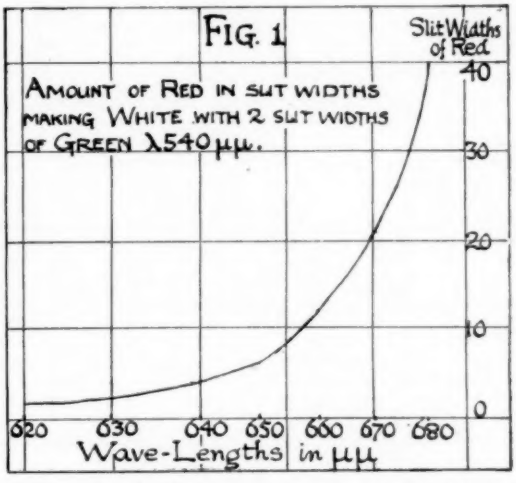
W.s.d. = White scale divisions.

The following is a table of complementaries made in each case to match 10 scale divisions of white.

Red	2·5	λ 633 μμ	+2·5	λ 540 μμ
"	2	620	+2·5	540
Orange	1·5	600	+10	500
"	1·5	600	+15	495
Yellowish-orange	2	595	+12	490
Yellow	2	585	+12	485
"	3	580	+12	480

= 10 white in each case.

The man previously mentioned, who was not colour-blind but who made an anomalous equation, putting too much red in the mixed light, was examined with regard to two of the above complementaries. He is



a very accurate observer and matched 10·5 λ 633 μμ + 10·5 λ 540 μμ = 20 W. This mixture appeared too bright. He agreed with the normal match of 10 of each colour when the luminosity of the comparison white was reduced to 19 instead of the normal 20. It will be noticed that the proportions of red and green are the same in both and agree with the normal. He matched:—

2 λ 585 μμ + 9 λ 485 μμ = 10 W.

He used 9 scale divisions of blue instead of 12 to the normal amount of yellow.

THE SUBTRACTION FROM WHITE LIGHT OF DIFFERENT PORTIONS OF THE SPECTRUM.

Another method of ascertaining complementary colours is to remove certain portions from the recombined spectrum and then ascertain the colour. It must first be noted that the recombined spectrum does not match the white of the arc when the luminosities have been made equal. This is due to absorption by the prisms and lenses. When the recombined spectrum is matched against a white of equal luminosity of the arc light it has a tinge of yellow-green. An exact match at 12 in. is made by removing λ 550 μμ to λ 566 μμ. When the red is cut off from the above, commencing from the red end of the

[4] Colour Blindness and Colour Perception, International Scientific Series, 1891, p. 66.

spectrum to λ 650 μμ the adjusted recombined spectrum appears whitish-green, when cut off to λ 590 μμ it appears a vivid green. When the violet end of the spectrum is cut out of this adjusted recombined spectrum to λ 517 μμ it appears yellow, when cut out to λ 530 μμ, orange.

The following are the results of removing various portions without adjusting the recombined spectrum, the colours being removed from the wave-length indicated to the termination of the red end of the spectrum in each case.

λ in μμ.	Colour.
640, 630	Pale yellow-green.
620, 610, 600	Yellow-green.
590, 585, 580, 575	Green with tinge of yellow.
570, 560	Pure green.
550	Blue-green.
540	Green-blue.
530	Blue with tinge of green.
520, 510	Pure blue.
500	Blue-violet.
490	Blue-indigo.
480	Indigo.
470	Indigo-violet
460	Violet.

The following are the results of removing portions of the spectrum commencing at the violet end to the wave-length indicated in each case from the recombined spectrum.

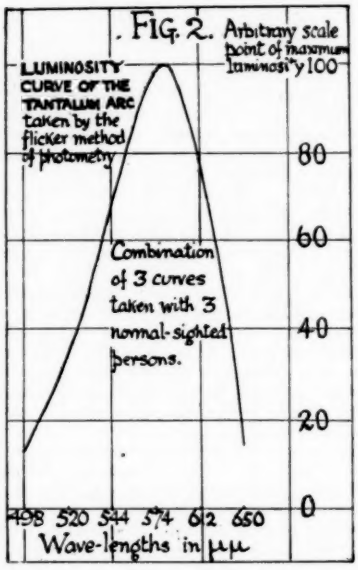
λ in μμ.	Colour.
440, 450, 460, 470, 480, 490, 500, 510	Yellow with slight tinge of green.
520	Yellow with very slight tinge of green.
530	Pure yellow.
540	Yellow with tinge of orange.
550, 560	Orange.
570	Reddish orange.
580	Orange-red.
590	Red with tinge of orange.
600	Red.

Another method employed by former observers for ascertaining the effect of fatigue on the appearance of colours is that of fatiguing only one eye, the other being used for the purpose of comparison. This method cannot be employed on account of the following fact, which does not appear to have been previously observed. When one eye is fatigued with a spectral colour, the other eye being kept closed and covered with the hand, and then the eye which has been fatigued is closed and a white surface viewed with the unfatigued eye, this appears as if it were mixed with the colour of the light used which was fatiguing the other eye. For instance, if the right eye be fatigued with red light the left eye being closed and covered with the hand, on closing the right eye and covering it a white surface appears to the left eye reddish, yellow appears orange, and violet, purple. This method, therefore, cannot be used to obtain information regarding complementary colours.

It will be noticed that with the exception of the pair of complementaries λ 585 μμ and λ 485 μμ those given do not agree with those of Helmholtz. Neither do his agree with those of other observers, as, for instance, with those of von Kries and those of König. Helmholtz put these differences down to individual variations, but this is certainly not the case with the observations given in this lecture, as numerous normal-sighted persons, including two well-known artists, have been tested with the same results. The differences in other tables are probably due to the fact that a comparison white light was not used, and then white was differently estimated by the observers. When the complementaries are viewed from a distance greater than 12 inches a much greater range of the spectrum may be used for making the match. The complementaries given are those to match the white of the Tantalum arc; obviously, if another white be used the results will be different. For instance, daylight is a much bluer white, and so the complementaries selected would contain more blue. The comparison white must therefore be noted in each case.

LUMINOSITY AND COLOUR.

It might be thought that the luminosity of two complementary colours was similar. This, however, is not the case—for instance, when equal slit widths of red λ 633 μμ and green λ 540 μμ are used to make white the luminosity of the green is higher than that of the red, though the dispersion is greater for the green. This will be seen by reference to Fig. 2, which is a luminosity curve of the Tantalum arc taken by the flicker method of photometry, from λ 498 μμ to λ 650 μμ. The curve is a combination of three curves taken with three normal-sighted persons. There



were only very slight differences between the three curves. The relation of luminosity to colour in connexion with the complementaries is one on which much further research is needed.

The facts in this lecture, whilst in complete accord with those previously given,[1] are inconsistent with any theory of three fundamental sensations of which the other colour sensations are compounded. Defects of light perception are quite distinct from defective colour discrimination. All degrees of colour discrimination may be classified as dichromic, trichromic, tetrachromic, pentachromic, hexachromic, and heptachromic. This classification is fact and not theory. For instance, the dichromic have two colour sensations, red and violet, with a neutral division in the spectrum. There are innumerable varieties of dichromic vision, as there may be shortening of either end of the spectrum or defects in the luminosity curve. When the luminosity curve is the same as the normal there is no evidence to show that the perception of white is not the same as the normal.

It will be noticed that many new facts given in this lecture are so novel and unexpected that much further research is needed before a definite explanation can be given of the underlying physiological processes. Such, for instance, is the fact that when one eye has been fatigued with spectral red light, the other eye sees white as reddish or any mixture as if red had been added to it, and that many colour-blind persons will agree with the normal white equation and others who will agree with it in some cases when the comparison white light is diminished and in others when increased in intensity, thus matching two white lights of unequal luminosity. Research in colour-vision requires the minutest accuracy in apparatus and method; results which are based upon experiments with coloured papers cannot be considered as fundamental any more than an analysis for arsenic by Marsh's method could be relied on when the sulphuric acid was bought at an ordinary oil-shop and the zinc at an ironmonger's, both being found on analysis to contain arsenic.

[1] The Physiology of Vision, G. Bell and Sons, 1920.

Some Points ON SPASM IN THE ALIMENTARY TRACT.

Presidential Address delivered on Jan. 12th, 1922, before the Harveian Society.

BY G. DE BEC TURTLE, M.D. DURH., M.R.C.P. LOND.

IN choosing a subject upon which to deliver this valedictory address I have selected that of spasm as it may occur in various parts of the alimentary tract.

DILATATION OF THE ŒSOPHAGUS.

Commencing with the œsophagus:—Idiopathic dilatation of the gullet has been recognised for some time, but until fairly recently very little has been written on the subject. It may occur during infant or adult life, but before describing the actual conditions present I want to remind you of certain physiological facts, which I think have some bearing on the subject. Deglutition has been divided into four stages. The first stage is when the masticated food, having been collected into a bolus in the mouth, is forced back by the act of swallowing past the anterior pillars of the fauces. The second stage is the passage of the food through the pharynx and past the apertures of the nose and larynx. The third stage is the passage of the bolus down the œsophagus to the cardiac end of the stomach. The fourth or last stage is the passage of the food through the cardiac ring into the stomach. The ring is formed by the cardiac sphincter muscle, and is normally in a state of contraction. If the bolus is small or the food liquid it may pass immediately into the stomach. On the other hand, food may stop at the cardiac orifice until the peristaltic wave which follows each act of deglutition reaches the orifice, when the sphincter muscle is expanded and the food shot into the stomach.

In certain animals the food remains much longer in the gullet, and may be returned to the mouth for further mastication, a process known as chewing the cud or rumination. This is due to reverse peristalsis in the œsophagus, and may occasionally occur in human beings.

The Cardiac Sphincter.

The cardiac sphincter is a circular band of plain muscle fibre situated at the junction of the œsophagus and the stomach. Its function is to prevent the passage of food back from the stomach into the œsophagus. It has two distinct activities: (1) a persistent contracted state or tonus; (2) rhythmic activity of contraction and relaxation. It is probable that the presence of free acid in the stomach influences the tonicity of the cardiac sphincter, for it has been shown that if acid be injected continuously into the duodenum just beyond the pylorus, the pyloric sphincter can be kept closed for an unlimited period. This response of the pylorus to the acid illustrates a general law of the alimentary tract that a stimulus causes a contraction above the stimulated spot. I think an example of this is the spasm that occurs at the ileocæcal valve when inflammatory changes are taking place in the appendix. I have already mentioned that the contraction of the cardiac sphincter undergoes rhythmic oscillation, allowing of slight regurgitation of fluid material from the stomach into the œsophagus. Each regurgitation, however, is followed immediately by a peristaltic wave, which causes the escaped material to re-enter the stomach. I shall mention this point again later in referring to certain types of vomiting.

Œsophageal Obstruction in Young Children.

This condition has been well described by Dr. Hugh Ashby, of Manchester, who showed several cases of the condition at the provincial meeting of the Section for the Study of Disease in Children of the Royal Society of Medicine, held in Manchester in June, 1920. Dr. Bellingham Smith has also recently shown cases at meetings of the same section, one of which had been relieved by the passage of bougies. The history is usually that the child above a year old begins to vomit all solid food at frequent intervals. Before this age liquids are taken well without any inconvenience; and vomiting only commences when solid food is begun. The condition of the gullet can be demonstrated quite easily with the assistance of the X rays and a shadow meal, and can be confirmed by the passage of bougies if necessary. In one fatal case the lumen of the œsophagus at the point of the stricture was just sufficient to admit of a fine probe being passed, and a microscopical section showed much hypertrophy of the circular muscle fibres and some excess of fibrous tissue. Whether this latter was due to the passage of bougies which had been used in the attempt to dilate the stricture, or to overgrowth of muscle, it is difficult to say.

As regards the treatment of this class of case in infants, it has been suggested that the regular passage of bougies of increasing size dilates the stricture, and by this means a certain number are alleviated and possibly cured. If, however, the infants are left, or the parents neglect to bring them for treatment, strictures may become so tight that an anæsthetic is needed to enable a bougie to be passed at all. In some cases it is found that under deep anæsthesia a great deal of the spasm is relaxed. It has also been suggested that in well-marked cases with tight strictures a gastrostomy might be performed, and the child fed entirely in this way in order to give the œsophagus complete rest for some weeks from the irritation of food.

Œsophageal Dilatation in Adults.

Cardiospasm with dilatation of the œsophagus may occur in adults. Plummer has reported 40 cases seen in the Mayo Clinic in 3¼ years. The patient complains of food sticking, causing discomfort at the lower end of the sternum; later there is regurgitation of food, unmixed with acid fluid, the bolus never having reached the stomach. The diagnosis can be made as before by means of the X ray and shadow meal, or by use of the œsophagoscope.

Dr. Arthur F. Hurst, in the *Quarterly Journal of Medicine*, 1914, described this condition in adults as achalasia of the cardia (deriving the term from the Greek α negative, χαλάω, to relax). X ray observations have shown that when each successive peristaltic wave passing down the normal œsophagus reaches its lowest extremity the cardia relaxes, just as later the pyloric sphincter also relaxes when the wave reaches it. But in this condition of achalasia, for some reason due no doubt to a reflex inhibition of relaxation, the cardia does not relax, and in consequence food collects and stagnates in the œsophagus, which becomes dilated and hypertrophied from repeated but fruitless peristaltic action. Dr. Hurst also demonstrated that this condition of achalasia can be quite readily overcome by an indiarubber tube filled with mercury, which passes without the slightest difficulty into the stomach, demonstrating the absence of spasm at the cardia. In the majority of cases no obvious cause for this spasm or failure of relaxation can be ascertained either during life or post mortem; in a few an ulcer or carcinoma of the stomach has been present.

Quite recently there appeared [1] an excellent description by Dr. N. Mutch of the treatment of the condition by means of a hydrostatic dilator, which apparently acts by forcibly overstretching the cardiac sphincter. The best records, as before mentioned, are those of Plummer, who followed up the subsequent histories of over a hundred cases treated by this method, and reported success in 81 per cent.

[1] The Practitioner, November, 1921, p. 339.

SPASM OF THE PYLORUS.

Probably the commonest point in the intestinal tract for spasm to occur is at the pylorus. It is frequently present in infants, and has to be distinguished from stenosis (a point I shall refer to again), and it is quite usual to meet it in adult life, generally secondary to some condition such as ulcer or new growth in the stomach or duodenum; but it may occur without any primary cause being discoverable. The principal symptom is vomiting, and I want here to say something about certain types of vomiting.

Types of Vomiting.

I have already mentioned rumination or regurgitation of the surplus food. It occurs in strong, vigorous, and healthy babies; it appears, in fact, to be nature's way of getting rid of the excess quantity which the child cannot digest. The habit, for such it is, is associated with a hyper-excitability of the involuntary muscles, and in some cases pylorospasm has been found. This is what might be described as the simple type of vomiting, and merely depends upon an over-distended hollow viscus emptying itself in the reverse way because, the pylorus being closed, nothing can escape down the intestinal tract.

Take next the vomiting of pregnancy. This has always been looked upon as, and undoubtedly is, a reflex act, but this does not explain how and why it occurs. As is well known, it is most frequent when the patient first assumes the erect posture in the morning, and the vomited material as a rule is little in quantity, and consists generally of a small amount of mucus and possibly a portion of the previous evening's meal, but generally only mucus. It is, I think, a well-known fact that one of the ways to check this regurgitation is to put a small quantity of food into the patient's stomach while she is still in the recumbent posture; if this rule is carefully carried out a surprisingly large number of these cases yield to this very simple method of treatment. The regurgitation of the mucus, &c., is obviously due to an abnormal inhibition of the contraction at the cardiac ring, and this abnormality is overcome by putting the distal part of the alimentary tract into action—viz., by giving it some work to do.

Another type met with during the late war was of particular interest. I refer to the slightly shell-shocked and neurasthenic case, whose chief and perhaps only symptom was persistent vomiting. I saw quite half a dozen of such cases, and I believe I was responsible for coining the term "professional vomiter." No medicinal or dietary treatment seemed to have the slightest effect on checking the condition. In some cases one could obtain a definite history of its commencing from a bad stench in the trenches or a gas attack, and in others there was a negative history. Those were, I am sure, cases of spasm, either cardiospasm or pylorospasm, more probably the latter, due to some derangement of the neuro-muscular mechanism of the stomach.

Nervous Mechanism of the Stomach.

To turn for a moment to this mechanism, the centres which cause constriction are in the medulla oblongata and the fibres run almost entirely in the vagi. In the medulla also are fibres causing the pylorus to relax or gape; apparently the path for these is down the cord and by the splanchnic nerves. It is in this way possible to trace the influence of the nervous system upon the movements of the stomach, which is well shown by the fact that psychical conditions, such as anger or pain, may at once stop, or at any rate partially inhibit, any gastric movements. The closure of the pylorus is reflex, and the stimulus for this movement is the action of the hydrochloric acid on the mucous membrane of the duodenum. Pylorospasm, therefore, may result from central impulses or local causes, and the latter may be either an abnormal amount of or an altered gastric secretion such as hyperacidity, or an ulcer or new growth in the vicinity.

DIFFERENTIAL DIAGNOSIS OF SPASM AND STENOSIS.

I mentioned just now that the condition may occur in infants, and has to be distinguished from cases where definite stenosis at the pylorus exists, and I have drawn out a short table indicating the main differences which enable one to arrive at a diagnosis.

STENOSIS.	SPASM.
1. Boy.	1. Either sex.
2. No evidence of pain.	2. Evidence of pain, crying, &c.
3. Vomiting some time after food, very forcible, through nose, &c., part of contents retained.	3. Vomiting soon after meal, and whole stomach contents returned.
4. Much dilatation and hypertrophy.	4. No evidence of gastric dilatation or hypertrophy.
5. Typical peristaltic waves precede vomiting.	5. Before the vomiting commences the stomach may stand out distinctly, but no definite peristaltic waves.
6. Definite pyloric tumour.	6. No pyloric tumour.
7. Constipation.	7. Motions scanty, but slight diarrhœa sometimes.

As regards the ætiology of hypertrophic pylorus there are two schools of thought: (1) Those who hold that the condition is a primary congenital hyperplasia, and that the abnormal functions are the result and not the cause of the muscular enlargement; (2) those who say it is always the result of some antecedent overaction, and who account for the presence of the hypertrophy by assuming that there has been muscular overaction, such as incöordination of the stomach and pylorus for some time, and that this incöordination may have begun during intra-uterine life when fluids are passing through the fœtal intestinal tract.

ENTEROSPASM.

Coming now to enterospasm, it may be defined as a tonic contraction of the muscular coats of the intestine leading to narrowing or complete occlusion of the intestinal lumen. It is probable that the intestine behaves like this in acute and violent enteritis, and may only involve certain parts. Rigid intestinal contraction is also met with in lead colic, and—combined with it—tetanic contraction of the muscular wall of the abdomen (this may be cited as an example of enterospasm due to toxic origin). Colic is in general merely the result of violent local tetanus of the intestine. Enterospasm never occurs as an independent neurosis in subjects otherwise normal and healthy; if it appears to be so, remember that the patient may be in a preataxic stage of tabes dorsalis. The colon is more often affected than the small bowel, and of the colon the first and last portions are most liable to spasm—that is to say, the cæcum and the rectum. Even the appendix itself may be a defaulter in this respect, for a small foreign body, such as a grape stone or fæcal concretion, is quite sufficient to set up violent appendicular colic, which is nothing more than spasm or contraction of the muscular coat of the appendix in its endeavour to expel the intruder.

Dr. H. P. Hawkins some years ago drew attention to the fact that spasm occurring in the neighbourhood of the ileocæcal valve might simulate an attack of appendicitis. I am quite sure many of us have seen an appendix removed, and subsequently the patient has returned complaining of pain in the region of the cæcum; the question that has then to be answered is: Is the pain due to some pathological adhesion following the operation, or is it simply due to local spasm of the cæcum, and, if so, was that spasm probably not already present before the operation was performed? As regards this local spasm of the cæcum, two photographs of a case will illustrate what I mean.

The patient was a lady, aged 55, whose chief symptoms were abdominal discomfort scarcely amounting to pain, obstinate constipation, and distinct gurgling, which could be elicited at different times all over the colon, but was most marked over the descending portion. New growth was suspected, but a rectal examination was negative, and a shadow

meal subsequently revealed the true condition. Complete rest, careful dieting, and anti-spasmodics were sufficient to bring about a cure, and the patient was able to return to her work.

Sir Thomas Horder showed a case at a meeting of the Section for the Study of Disease in Children, in April, 1921, which it was thought might be a case of idiopathic dilatation of the colon. I confess I only examined the child upon that one occasion, and it is difficult to be certain unless one sees the case several times; but it struck me that it was suffering from a condition of spasm in the large bowel very much resembling the adult case I have just mentioned. I ventured the opinion at the time that the whole colon was not dilated, but that in places it was quite definitely constricted.

Dilatation of the Colon.

In connexion with the large bowel, I wish to refer to this particular condition of idiopathic dilatation of the colon, or Hirschsprung's disease. It is a somewhat rare condition characterised by obstinate constipation, accompanied by great dilatation and hypertrophy of the colon, without apparently any organic obstruction. It nearly always occurs in males, and is not as a rule noticed clinically until some weeks or months after birth. A few cases have been followed into adult life, one being reported at the age of 28, but the majority die young. It may be divided into four groups:—

(*a*) Those in which the symptoms occur at birth. These are exceptional.
(*b*) Those in which they occur within a few months. These are the commonest.
(*c*) Those in which they occur after some years and yet are unaccompanied by any pathological lesion.
(*d*) Those which occur later in adult life.

Some congenital cases show symptoms from the first, whilst others with a milder form of the disease resist the distension for some time, although they show lack of expulsive power always; and still others have periods of improvement. In nearly all cases constipation and abdominal distension occur simultaneously. In those cases which survive a year or two there is a decided tendency to repeated attacks or rather exacerbations. In one case reported the condition was noticed within a few weeks of birth, but the child lived to be 8 years old; at death the colon measured 23 inches in circumference. The rectum was not involved in the dilatation, being normal in size. The actual cause of the condition, if due to one cause alone, is at present unexplained. Several theories have been advanced, the principal being that there is a spasm of the rectum or anus resisting the passage of fæces. In one case which I saw this was present in a very marked degree, but it would be difficult to say whether it was primary or secondary.

It is well known that the sigmoid, or as it should more properly be called the ileopelvic colon, is much larger relatively in the child than in the adult, and also that frequently the mesentery is much longer than normal, and it has been suggested that the condition might be due to kinking of this portion of the gut; this would account for the rectum not being involved in the hypertrophy in certain cases.

NERVOUS MECHANISM OF DEFÆCATION.

There has been put forward the theory that there is some congenital defect of innervation of the intestine, so that its contractions are ineffectual and constipation is the result. Before discussing this theory it will be well to consider the nervous mechanism of defæcation.

The anal sphincter muscle is normally in a state of tonic contraction—a centre in the lumbar region of the cord has been proved, by division of the cord, to govern its action—and in the ordinary way fæces collect in the sigmoid and rectum brought there by the peristaltic movements of the intestines. These pressing against the sphincter cause an afferent sensory impulse to be sent up to the brain through the lumbar centre (hence we are conscious of the fact when the rectum is full). The brain sends out an efferent impulse to the centre in the cord, and this again sends on the impulse to the sphincter, which is then relaxed and defæcation takes place.

FIG. 1.

Cæcum without spasm.

FIG. 2.

Cæcum with spasm; six-hour interval from Fig. 1.

I am indebted to Sir Archibald Reid for the above skiagrams.

Now it has been proved by division of the cord that the lumbar centre can act by itself, so that the fault in the innervation, presuming such to be the case, must lie with the lumbar centre; it does not send out the proper efferent impulse, and the sphincter remains contracted. This seems to me to be somewhat like the spasm or failure of relaxation met with at the cardiac ring and at the pylorus, and I am therefore inclined to think that these conditions are very closely allied to one another in that they are all due to nervous incoördination.

ANAL SPASM.

Coming lastly to the region of the anus, we find spasm may occur in the sphincter muscle under certain abnormal conditions. This, as I have already explained, is always in a state of tonic contraction, but there may be superimposed a very definite degree of spasm. Take the pain which occurs in an ordinary thrombosed pile; a certain amount of it is no doubt due to inflammatory changes

taking place in the vessels, but a good deal is, I believe, due to the overaction of the external sphincter muscle, more especially if the pile is just being extruded through that muscular ring. The same state applies to a fissure. Anybody who has attempted to make a rectal examination under either of these conditions will, I am sure, have realised this superimposed spasm as I have called it upon the normal tonically contracted sphincter muscle, and if we relieve this spasm we cure at least 50 per cent. of the patient's pain.

In this short address I have not touched upon the question of treatment—all I have done is to try to indicate where in the alimentary tract one may look for, and expect at times to find, abnormal spasm; and, secondly, to try to point out why this abnormal spasm may occur.

GAMMA RAYS AND MALIGNANT DISEASE.

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THE introduction of the Erlangen method of X ray treatment marks a definite advance in an important branch of professional work, and like most other advances of a similar nature, especially in the earlier stages, it has come in for a large amount of adverse comment. Few medical men have clear ideas on the general principles governing the use and action of X rays in therapeutics, but a common knowledge of these principles should serve as a useful corrective to misunderstanding and inaccurate statement. Regarding the alleged dangers of the Erlangen technique it is generally admitted that, in all circumstances depending on human control for their proper application, accidents are liable to, and sometimes do, happen. Lives have been lost through error in dispensing dangerous drugs. Apart from this risk the Erlangen method is not dangerous in competent hands. Even if there were some appreciable danger it would need to be very serious to be comparable to the grave plight of most of the patients who come to us for possible relief. During the past year I have treated not less than 300 cases by this method without seeing any severe X ray burn; nor has there been a single instance of sloughing. It is largely owing to unfortunate antagonism that the method cannot yet be carried out in its full perfection here as it is at its place of origin. For want of skilled assistance dosage lacks that complete accuracy which constitutes the chief feature of the system.

Changes following Applications of Gamma Rays.

The principles of application are illustrated in the form of a diagram (Fig. 1), which may be taken as substantially accurate, although it will, of course, be understood that no sharp line of demarcation exists between the different zones which gradually shade into their neighbours by imperceptible degrees. These principles are the result of an enormous number of observations, clinical as well as experimental, and they will be found to underlie and to determine the degree of success likely to follow on any therapeutic technique where the gamma ray is the agent employed for the treatment of malignant disease, whether the source of radiation be radium or the X ray tube. Moreover, they are based on physical laws outside our control and any procedure that violates them is bound to fail.

To take the case of radium first; the available quantities of this element being small it is necessary to bring it as close as possible to the diseased tissue to get any appreciable effect. If the lesion is strictly localised and the radiation dose so adjusted that no part of it lies outside Zone C, the application is certain to be successful. All cells in Zone A will be destroyed; some malignant cells will be destroyed similarly in Zone B and the destruction of the rest will be completed in the course of the violent reaction set up in the adjacent normal tissue elements. But while cancer cells are effectually disposed of in these two zones the procedure is crude and painful. It is only under the conditions that obtain in the two zones, A and B, that one may speak of the X or radium rays as "killing" cancer cells. Even then the term is not literally accurate. As a therapeutic procedure it is unnecessarily violent, at times extremely painful, and not unattended with danger. In Zone C we have what may be described as the ideal conditions. Cancer cells are powerfully depressed or devitalised, there is no violent reaction in the normal tissue elements, but they are strongly stimulated, an active local leucocytosis is produced, with a breaking down

FIG. 1.

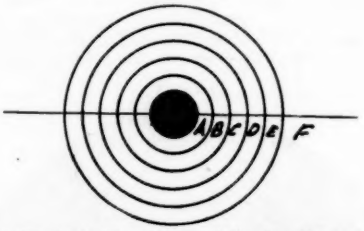

Diagram to illustrate the changes following the application of gamma rays into, or on the surface of, living tissues. Surface applications are represented on one side of the horizontal line, and the use of a plate instead of a cylindrical tube would merely alter the shape of the various zones without affecting the principles involved. The tube is shown black enclosing the radium which is shaded. It is assumed that the duration of the exposure is sufficient to cause necrosis in the immediate vicinity of the capsule, as is not uncommonly the case.
Zone A.—Intense overdose, resulting in necrosis.
Zone B.—Overdose followed by severe reaction (X ray burn) and not infrequently accompanied with severe pain.
Zone C.—Normal dose having a "devitalising" action on malignant cells, powerfully stimulating normal tissues, with active leucocytosis, breaking down and removing abnormal cells. The reaction is never severe and seldom painful.
Zone D.—Malignant cells are depressed or "paralysed," suspending their activities for some weeks or perhaps months. If not further interfered with they will eventually revive. The adjacent normal tissues are mildly stimulated.
Zone E.—Malignant cells are powerfully stimulated in this zone, especially the carcinomatous variety, while normal tissue elements are not affected to any important degree. This is the danger zone of radio-therapeutics.
Zone F.—The effects in this zone are not marked in the case of individual doses, but where they are frequently repeated, as in the usual method of X ray treatment, it is probable that by their cumulative effect malignant cells are inhibited or even caused to disappear, and experience bears this out. Certain so-called "immunising" effects are also ascribed to these fractional doses, but there is also the real danger of stimulating malignant cells to increased activity.

of the malignant cells, and the debris is carried away by the lymphatic circulation, very much in the same way the post-partum uterus is reduced to its ordinary dimensions. If the whole of the growth is not enclosed by Zone C but extends into D such cells will be paralysed, so to speak, and may remain dormant for some months. In the meantime the obvious lesion disappears and as no perceptible changes occur for some time the case may come to be regarded as at least clinically cured, possibly even recorded as such.

Recurrence, however, is only a matter of time, but this time may be quite long where the general health of the patient is very good. Treatment by irradiation cannot succeed where the general health is seriously impaired, or where the patient is losing weight and strength and is anæmic. The presence of a cancerous cachexia is a direct contra-indication. Success depends on a normal activity of ordinary vital processes; irradiation can only turn the scale in favour of the patient. Unfortunate as it is in the last instance where recurrence has taken place through some outlying parts of the growth being insufficiently irradiated, it is far more serious when the extension is only a little farther out and the malignant cells receive a stimulating dose. The progress of such a case depends on the degree of stimulation. I have been told of a sudden increase taking place within

24 hours; I have seen a case myself where it was obvious in less than a week, and several where it was delayed for longer periods.

Zone E constitutes the real danger area of radiotherapeutics; it is owing to the conditions that obtain there that we run a risk of making things worse instead of better, and this is likely to happen where efforts are made to imitate the Erlangen technique with unsuitable equipment. Treatment by the single-full-dose method should not be attempted unless there is reasonable certainty that the conditions represented in Zone C can be secured in every part of the affected area.

Assuming that the conditions outlined above are substantially accurate, we are in a position to account for apparently contradictory observations. It explains how, as I foresaw years ago, radium was bound to prove a failure in the treatment of carcinoma, except under very limited conditions, so long as the supply is so severely restricted. We have the reason for the sloughing and intense pain that not infrequently follows radium applications—both due to the overdose necessarily given in Zones A and B. We also see how any source of radiation placed into or in contact with the lesion is a crude procedure unlikely to be followed by appreciable success. We have the reason why, only too frequently, parts of the growth are stimulated to increased activity and the patient's condition made worse than before.

Much the same thing has followed in the wake of the demand in recent years for larger X ray doses, as distinguished from radium, made more easily possible after the advent of the Coolidge tube. For a time results improved along with the higher dosage, but further increase of dose was not accompanied by a corresponding improvement; when the dose was pushed stimulation of the cancer cells followed.

In regard to the Erlangen technique it has been stated, quite truly, that better results follow in cases that have not been operated upon. This is not to be interpreted as an expression of antagonism to surgery. The aim of the radiologist is simply to produce evenly throughout the affected area the conditions indicated in Zone C; the rest must be done by the patient's own vital processes, and for these to work at their highest efficiency the local blood and lymph circulations must be intact, obviously impossible after surgical operation.

Technique of Application.

Uniform dosage being possible only when the source of radiation is some distance away from the lesion—this might be done with radium provided we had enough of it, say several ounces perhaps, suitably mounted and enclosed—we are fortunate in the capabilities of the modern X ray tube. The distance at which this is placed should depend on the relation of the lesion to the surface of the body. If the lesion be quite superficial only one port of entry is available and the tube is placed at the maximum distance, the length of exposure being increased according to the well-known physical law. In this way a nearly uniform irradiation is obtained for lesions under 3 cm. in thickness, and as the normal tissues recover first, a second dose at an appropriate interval usually suffices.

As the site of the lesion recedes from the surface, more ports of entry become available, the tube is brought closer to the body, and strange as it may seem at first, a lesion such as a carcinoma of the cervix can be more quickly and more evenly irradiated than one on the surface. In this connexion it is worthy of note that a higher degree of success has been attained in cases of uterine carcinoma than in cancer of the breast. The principle is shown diagrammatically in Fig. 2, where the large circle represents the body surface and the small dark circle a central portion of the tissues enclosing the lesion. The points "*a*" outside the larger circle indicate the several positions of the anticathode in a case where six ports of entry are necessary to get the requisite dose. In each of these the skin area enclosed by the cone of rays receives the same amount of radiation. This unit skin dose, as it is called, is the maximum that may be given without damage to the skin. Correctly administered a mild hyperæmia appears in about seven days, followed by "tanning" about three weeks later. This change is very constant and affords a reliable index to correct dosage. Obviously but a portion of this dose reaches the lesion. If the latter be 10 cm. from the surface, the loss by dispersion alone is nearly 50 per cent., and in addition there is the loss from absorption of the intervening tissues, which varies with different kinds of X ray tubes and even between tubes of apparently similar construction. This "percentage of the depth dose," as it is termed, must be ascertained for every

FIG. 2.

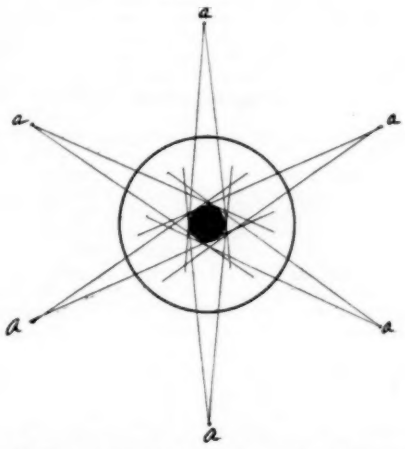

Diagram to illustrate irradiation of a deep lesion from numerous ports of entry. The large circle represents the body surface, say, a cross-section of the pelvis, and the small dark circle a central portion of the pelvic tissues enclosing the lesion and receiving the full dose of X rays from six different positions of the same anticathode, indicated by *a*, *a*.

tube and allowed for in the calculation of every dose administered. Instruments for making these measurements are available and form a part of every complete equipment. It is easy with one of these to build up a phantom for any given case and accurately determine the percentage received by the lesion through each port of entry.

Results.

Though the great majority of cases I have treated by this method are not favourable from the point of "apparent clinical cure," or more or less prolonged relief, I have seen enough to justify the statement that the Erlangen method is not only the best system of X ray therapeutics yet devised, but is probably the most important recent contribution to the solution of the problem of malignant disease. The system has its limitations; it is, as I have stated, of little use where the general health is seriously impaired; no important success, for instance, has attended efforts to deal with carcinoma of the stomach. It is also of no help where the disease is extensive or after dissemination has begun. Additional difficulties are encountered in cases where the disease has invaded bone, and also in certain localities, such as the cervical and maxillary regions, and the vulva. These difficulties are, of course, not peculiar to this method of treatment. To sum up the conditions favourable for success: first, there is the general health of the patient; secondly, the lesion must be localised to a reasonably small area and treated before it has begun to widely invade the adjacent tissues and before there is any distant dissemination; thirdly, the technique must be carried out accurately and completely at one sitting, so that every part of the lesion receives the requisite dose; and lastly, the health and well-being of the patient must be carefully controlled subsequent to irradiation. If all these conditions are present it may be laid down, almost as an axiom, that

the malignant growth will disappear, and with but a trifling disturbance of the patient's ordinary life.

Naturally, the circumstances are not always as favourable as this; in dealing with a rather extensive lesion some patients feel tired for several days after irradiation; others are sick before the end of the treatment, and vomiting at times continues for some hours. Both these undesirable after-effects soon pass off. One effect of a full dose is a fall in the number of red blood corpuscles from which six to eight weeks are needed for recovery. If the case be one where a second treatment is necessary, it should not be given until the blood has returned to normal, or nearly so. The nearer it is to the normal the more likely is an irradiation to be followed by a satisfactory result.

As to the relative advantages of radiology and surgery for the relief of victims of malignant disease I believe there are grounds for thinking that before many years surgery may become auxiliary to radiology. Speaking broadly, even now it is possible that radiology can do more than surgery under equally favourable conditions; it is at least significant that in the Erlangen Frauenklinik, where surgical methods have been definitely abandoned for cases of malignant disease of the female pelvis in favour of X ray treatment, greatly improved results have been obtained. Evidence is overwhelming that radiology can be of the greatest assistance in dealing with malignant disease, and recognition of this fact should lead surgeons and gynæcologists to seek the radiologist's coöperation immediately the nature of the case is determined and before any treatment has been applied. This is the only form of coöperation that can be of real help in improving the patient's chances of recovery. Up to the present surgery has had its own way; we see the results; they are not good enough; let us try to improve them!

DEEP X RAY TREATMENT OF CANCER:

A PERSONAL IMPRESSION OF THE ERLANGEN FRAUENKLINIK.*

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LAST July Prof. Dreyer and I had the opportunity of seeing the recent advances in X ray treatment at the Universitäts-Frauenklinik, Erlangen, Bavaria, the technique there elaborated by Prof. L. Seitz and Prof. H. Wintz, and the results obtained therewith in cases of fibromyomata and malignant disease.

The Apparatus Used.

Although not the first worker in this field, Prof. Wintz has made a number of improvements both in the apparatus used and in the measurement of X rays. His apparatus is a powerful one, consisting of two coils which together give a 16 in. parallel spark. The X ray tube has an ingenious mechanism which automatically keeps the vacuum constant, and it is claimed that, working with very high tension currents, this tube lasts longer on the average than the Coolidge tube. Prof. Wintz early discarded the Kienböck strip and the Sabouraud pastille for measuring X rays, the former as unreliable for rays of different hardness, the latter as not giving sufficiently accurate graduations. He then developed the iontoquantimeter, invented originally for this purpose by two Frenchmen, Villard and Szilard, and he has used this method ever since. This instrument is based on the fact that air is ionised by X rays passing through it, and thus becomes a conductor of electricity. The more X rays, the better is the air a conductor. The leakage of a charge on an electroscope connected with the ionising chamber (which is laid on the patient's skin) is then a measure of the amount of X rays passing through the ionising chamber. The method in practice is a somewhat laborious one, as compared with the Sabouraud pastille, but a much greater degree of accuracy can be obtained. In actual practice the treatment is carried out by time, the tubes being standardised by the iontoquantimeter at frequent intervals. As tumours are situated at various depths below the skin, it is obviously of great importance to ascertain how much of the dose of X rays received by the skin penetrates to various depths. For example, only some 20 per cent. of the rays falling upon the skin will reach a depth of 10 cm. This 20 per cent. is the percentage deep dose, as it is called, at 10 cm. It is obvious, then, that the greater the percentage deep dose, the nearer does the dose in the depth approximate to the dose received on the skin. Now the skin must not receive a greater dose of X rays than will produce the characteristic erythema in eight to ten days' time, otherwise the skin will be burned. This dose is called the erythema dose, and is given the value 100 in Wintz's system of measurement, so that in treating tumours beneath the surface one can give the skin no more than the erythema dose, and can only increase the amount of X rays received by the tumour by increasing the percentage deep dose.

The Percentage Deep Dose.

The percentage deep dose has been found to depend on the following factors:—

1. *Thickness of Overlying Tissue.*—The greater the thickness of this, the more will the X rays be absorbed in passing through this tissue. The thickness can be decreased slightly by employing a suitable compression tube, and the percentage deep dose will thus be increased.

2. *Dispersion of the Rays.*—The further the X ray tube is from the patient, the less will be the loss of X rays from dispersion. This follows, of course, from the law of inverse squares. For example, if the tube is 23 cm. from the patient, one-half of the energy of the rays will be lost from dispersion alone at a depth of 10 cm., but if the tube is distant 100 cm., only one-sixth of the rays are lost at a depth of 10 cm. Necessarily the erythema dose takes much longer to give in the latter case, some 20 times longer than in the former, but the percentage deep dose is much increased. In certain cases it is necessary to employ this method.

3. *Quality of the Rays.*—The more penetrating the rays, the greater will be the percentage deep dose. A powerful apparatus such as that in use at Erlangen will produce very hard penetrating rays, but will also emit a number of softer less penetrating rays. These are cut out by interposing a plate of aluminium 10–12 mm. thick between the X ray tube and the patient. The aluminium absorbs the soft rays, the harder more penetrating rays passing through it. In practice a 0·5 mm. zinc plate or filter, as it is called, is used instead of the 10–12 mm. of aluminium, the effect being the same. The percentage deep dose is not improved by using more than 0·5 mm. zinc; in other words, the rays that pass through a filter of this type are practically homogeneous—i.e., they are of approximately equal penetration. It was formerly thought that a thickness of 3–4 mm. aluminium was sufficient, but such a filter lets through a number of soft rays which act on the skin and are easily absorbed, so that the deep dose is comparatively small.

4. *Area of Tissue Irradiated.*—The more tissue that is irradiated the higher the percentage deep dose. The increase is believed to be due to secondary radiation from the tissues.

The Optimum Therapeutic Dose.

Profs. Seitz and Wintz have laid down what they call the optimum therapeutic dose for various diseases. If the erythema dose is called 100 per cent., the dose that the ovaries must receive to sterilise the patient is 34 per cent., the dose to kill carcinoma cells—the so-called carcinoma dose is 90–110 per cent., the sarcoma dose is 80 per cent., and so on. It is stated that if carcinoma cells receive 40 per cent. they are stimulated, and grow faster than ever. If the rectum receives 135 per cent. a severe diarrhœa will result, and if the intestine receives 150 per cent. it will ulcerate and perhaps perforate. These figures may not be quite accurate, indeed other workers do not altogether agree with them, but it is at any rate the right way of tackling the subject, to control by accurate measurement of the rays. The X ray worker is at once stimulated to elaborate new techniques to bring these doses

* Being the substance of a paper read at a recent meeting of the Oxford Medical Society.

to bear on diseased tissues, while he is limited in other directions because of the destruction of normal tissues.

In the treatment of fibromyomata, the Erlangen technique is to sterilise the patient by giving each ovary 34 per cent. of an erythema dose. As the ovaries lie some distance beneath the skin, it is difficult to do this with one port of entry for the X rays, so two ports are used, one in front and one behind. In a thin patient the full erythema dose in these two ports of entry is not necessary to ensure the ovary receiving 34 per cent. The hæmorrhage soon ceases, but the tumour only begins to shrink some months after the treatment. There appear to be very few contra-indications, and, according to the authors, even accompanying tubal inflammations will subside in time.

The Erlangen school believes firmly in carrying out the whole sterilisation at one sitting, lasting two and a half hours, on the ground that the patient is well able to stand it, that it is more convenient and economical, and that the practice of spreading the treatment over three or four sittings introduces a factor about which little is known—viz., how far the cells of the Graafian follicles recover between the partial lethal doses. It is known that if the sterilisation dose is divided over three or four sittings, more than a total of 34 per cent. has to be given to ensure sterilisation. Should a sarcoma be suspected, either owing to the age of the patient, or the rapid growth of the tumour, the sarcoma technique and dose is employed. The published results of the treatment of fibromyomata by X rays are good, only one failure in 170 cases being recorded. It is interesting to note that if a dose of approximately 28 per cent. be given to the ovaries, a temporary sterilisation often results—i.e., menstruation ceases for some months, to return again later; the explanation being that the more mature Graafian follicles succumb, while the immature follicles are more resistant and survive.

Treatment of Cancer.

The Erlangen school have had more experience with the treatment of cancer of the cervix uteri than with any other cancer. They began by combining radium with X rays in the treatment of this cancer, but later discarded radium as unnecessary. They concentrated six erythema doses on to the cervix, using three ports of entry in front and three behind. If the cervix receives 20 per cent. of an erythema dose from each port of entry, it will receive $6 \times 20 = 120$ per cent. from the six erythema doses. Unless great care is taken, the rectum lying just behind the uterus will receive 130 per cent., which is often enough to excite a severe diarrhœa. For another reason no more than six erythema doses should be given at one sitting, as the blood even with this dose suffers considerably, notably a destruction of red cells and lymphocytes. The blood, however, recovers in six weeks' time unless the disease is far advanced with pronounced cachexia and anæmia. In these cases the blood never recovers and the patients invariably die. For the reasons stated in the case of sterilisation, Profs. Seitz and Wintz are strongly in favour of giving the six erythema doses in one sitting, lasting about three and a half hours. It is admittedly a very large dose of X rays for a patient to receive at one time, and the patient often suffers from a general reaction with vomiting and other symptoms after the treatment is over; but the authors justify this temporary discomfort by the more certain results obtained. In any case the reaction is smaller and more temporary than after a severe surgical operation.

Nevertheless, the results obtained by this method were only moderately good and not much better than those where radium alone was used. Seitz and Wintz were convinced that the cervix uteri had received radiation to kill all the carcinoma cells, and they ascribed their failures to extension of the growth into the parametria, for although the cervix had received the carcinoma dose, the parametria had not. They were further supported in this theory by the experience of surgeons that the more extensive Wertheim operation had very considerably improved the operative treatment of uterine cancer. Accordingly they devised a technique, which they called the Rontgen-Wertheim, in memory of the two men on whose work it was ultimately founded. This technique is carried out as follows:—

1. *Treatment of the Cervix Uteri* as before with six erythema doses concentrated on the cervix uteri.

2. *Treatment of the Parametria.*—This cannot be carried out at once because six erythema doses is already a very severe dose of X rays, from which the blood alone takes some weeks to recover. The interval obviously should be as short as possible, and the authors found that six weeks must elapse before a second set of six erythema doses is given to one parametrium. As before, three ports of entry are used in front and three behind, all concentrated on the parametrium. After another six weeks' interval the other parametrium is treated in a similar fashion.

The results with this technique have been promising so far, and the authors claim a much larger percentage of successes than with any other known form of treatment. Indeed, they say that cure is almost certain if the disease is not too far advanced. Naturally they do not claim to be able to cure cases with metastases and profound cachexia.

Their experience with cancer of the breast is more limited. Here the problem is a different one. Instead of a centrally situated tumour which can be approached from all sides, we have a tumour whose base at most is 3–5 cm. beneath the skin. If the breast is poorly developed it is impossible to use even two ports of entry because the two bundles of rays would cross just below the skin, and the tissues would be burned. In this case the percentage deep dose is increased by (1) placing the X ray tube at a distance of 100 cm. from the patient instead of the standard 23 cm.; and (2) increasing the area irradiated by enlarging the one port of entry to 10–15 cm. instead of the standard 6–8 cm. In this way it is found that at 3 cm. depth 90 per cent. of the erythema dose is active, and this amount corresponds to the minimal carcinoma dose. It may be repeated at a suitable interval if thought necessary. In the well-developed breast, two ports of entry are used in the ordinary way, and it is found that at 5 cm. depth 45 per cent. of the erythema dose is left and $2 \times 45 = 90$ per cent., so that here also the minimal carcinoma dose can be given. The axillary glands are, of course, treated as well and given the carcinoma dose.

No actual results have been published but they are understood to be promising. The same holds for carcinoma of the vulva—in this case the technique is the same as in carcinoma in a poorly developed breast, the tube at 100 cm. distance, and a large port of entry. In carcinoma of the stomach the results are not very promising; it is, indeed, as unfavourable a cancer to treat with X rays as it is with surgery. It is often diagnosed late in the disease, when there are metastases in the liver; another complication is that the tumour itself is generally quite close beneath the skin, while the glands lie deeper. The results are understood to be improving as more experience is gained.

With regard to the treatment of sarcoma, the problem is at the same time simpler and not so simple. The sarcoma dose is given as 80 per cent. of the erythema dose, although many would no doubt disappear with a smaller dose than 80 per cent. It is easier to ensure that a tumour receives 80 per cent. than 90–110 per cent., but a sarcoma forms metastases via the blood stream, and may, while still quite small, have already given rise to metastases in the lungs. Carcinoma, on the other hand, spreads more slowly by the lymph channels, and its extension is held up temporarily by the lymph glands, so that it remains local for some considerable time, thus lending itself to local treatment with X rays. The disappearance of the main sarcomatous tumour may be dramatic after X ray treatment, while metastases already are present in distant organs, which are beyond treatment. Nevertheless Profs. Seitz and Wintz are of opinion that the prognosis in fairly small sarcomata is on the whole favourable.

Conclusion.

My own feeling is that credit is due to Krönig, Friedrich, Seitz, Wintz, and other workers not so much for the powerful apparatus which they have devised—though this is a considerable factor in their success—as for their introduction of scientific method into the problems connected with the dosage of X rays. First, the actual measurement of the rays with an accurate instrument; then, the measurement of the percentage deep dose at various depths and the study of the various ways in which this percentage deep dose could be increased; then, the estimation of the optimum therapeutic dose to be aimed at in different diseases; and lastly, the various techniques devised in order to get that dose where wanted without serious injury to the normal tissues. Among these techniques the Rontgen-Wertheim technique invented by Seitz and Wintz stands out as the most promising and successful.

One note of warning should be added. This method of carcinoma-therapy is such an intensive one, the therapeutic dose is so near the dangerous dose, that unless the X ray worker has an intimate knowledge of the apparatus, the technique, and the principles on which it is based, more harm than good may result.

A CASE OF SCLEREMA NEONATORUM.

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Sclerema neonatorum was fully described by Underwood in 1874. Parrot first distinguished it from œdema neonatorum by the absence of skin pitting; but some writers consider that the latter disease is an œdematous form of sclerema. Both diseases are stated to attack most frequently weakly children, foundlings, and those living under unhealthy conditions; and both have a very high mortality. The clinical picture given by most writers is that the skin progressively becomes waxy, leathery, rigid, and adherent to the underlying tissues, the temperature fails, pulse becomes poor, food is not taken because the child cannot suck, all functions are impaired, the fontanelle becomes depressed, and the child dies in 2 to 10 days. As regards the morbid anatomy, Parrot found a thinning of the corium and rete mucosum, atrophy of fat and contraction of vessels. But Ballantyne noted an increase in connective tissue, thus tracing a resemblance between sclerema neonatorum and the scleroderma of adults, in which the collagenic elements of the cutis hypertrophy and accumulation of connective-tissue elements causes atrophy of the sweat and sebaceous glands and hair follicles. The view of Knöpfelmacher that the lowered body temperature causes a solidification of the subcutaneous adipose tissue seems rather far-fetched. Alibert included, under the term scleremia, both the scleroderma of adults and the sclerema of infants. Stelwagon [1] also thinks that sclerema is allied to scleroderma, which latter Ehrmann regards as an auto-infection first affecting the thyroid gland, while other authorities regard it as a tropho-neurosis. Dr. J. F. D. Hunter's view [2]—that toxins invade the central nervous system because the protective function of the choroid plexus is not activated owing to thyroid insufficiency—would approximate to both these opinions.

The following case is that of K. N. M., an illegitimate male child, born at the Corporation Maternity Hospital, Carlisle, on Jan. 15th, 1921, the mother being a healthy well-nourished girl of 20.

The child weighed 5 lb. 5½ oz. at birth; he did not take the breast well, and breast milk was drawn off for him; on the third day he began to vomit about a quarter of an hour after each feed. Nothing abnormal detected; pulse very feeble, and small doses of stimulant were given. On the fifth day swelling was noticed in legs and thighs; the child was very lethargic and was still passing meconium. He was unable to suck and swallowed with difficulty an hourly ration of ʒii. of breast milk given with a spoon. On the sixth day the subcutaneous tissue of the thighs, buttocks, back of neck, back, and malar and nasal regions assumed a cartilaginous consistency; the skin over these parts was tender and dry, sometimes cyanosed, sometimes earthy in colour, of waxy appearance, and could not be pinched up from the underlying tissues. The facial expression became pinched, stiff, and corpse-like. The urine was markedly acid, and there was a faint smell of acetone in the breath. The child had a weak hoarse cry; he started at the least noise; the temperature was so subnormal as not to be registrable, and the pulse not palpable.

Treatment.—S. Wolff [3] has treated these cases successfully by keeping them in an atmosphere heated continuously to 40°–42° C. In the case here described, an incubator was improvised and the child was given thyroid extract gr. 1/16 daily, and grey powder gr. 1/8 daily. The bowels were given a high irrigation of sod. bicarb. solution, ʒi. to Oi. daily, and 1 gr. of sod. bicarb. was given every four hours by mouth. He soon began to take 1½ oz. of breast milk every two hours from the bottle without vomiting. On the tenth day the pulse was 116. On the eleventh day the temperature registered 95·4°F. On the twelfth day he was getting thyroid extract, gr. 1/16 twice daily, and ʒss. of cod-liver oil emulsion t.d.s. On the fourteenth day rectal irrigations were stopped, the thyroid extract was reduced to gr. 1/8 twice weekly. He now weighed 4 lb. 4 oz. He was taking breast milk every two hours, and cod-liver oil emulsion as before. He was gradually trained to live in a cooler environment, and occasionally to be washed instead of being rubbed with olive oil. On the twenty-second day he was discharged with improved skin condition, and having increased 3½ oz. in the last four days. He had to be weaned on the mother's account, and was put on cow's milk and water and the thyroid extract and sod. bicarb. continued. At 6½ weeks old he had developed into a more healthy child, gaining in weight; some hardness of the skin remained in the malar region, the colour was better, and the muscular movements more active. At six months of age he was normal, except for weight, while at nine months he had reached the normal weight for his age, was getting teeth, and had a good colour.

The treatment was based on the lines of overheating the child's bed to combat directly the subnormal temperature. Thyroid was given in addition on the assumption that the symptoms were primarily due to acute functional failure (possibly transitory) of the thyroid. The rectal irrigations with sod. bicarb. were given partly to counteract acidity, and partly to remove toxins from the intestinal tract, the existence of intestinal stasis being shown by the passage of pure meconium as late as the fifth day. Sir Arbuthnot Lane has shown a relationship between intestinal stasis and thyroid insufficiency by curing cases of myxœdema by removal of the colon. The toxins affecting the thyroid in the case of a newly-born child might be maternal as suggested by McCarrison, instead of being absorbed from the child's own intestine, but in this case the mother certainly gave no obvious signs of toxæmia. The relationship between intestinal stasis and thyroid insufficiency is shown by the common symptom-complex of chilliness, inertia, headache, constipation, pseudo-asthma. The relationship may be a vicious circle, for Fletcher Stiell [4] has suggested that stasis may be the result of thyroid insufficiency.

With regard to the low body temperature, the influence of the thyroid on metabolism is established, and the work of Eppinger and Feldman [5] shows the applicability of thyroid medication to a case of deficient metabolism in an infant.

I am indebted to Dr. Joseph Beard, medical officer of health, city of Carlisle, for his permission to use the notes upon the case, and for his suggestions in connexion with diagnosis and treatment.

[1] Stelwagon: Diseases of the Skin, eighth edition.
[2] Hunter: Brit. Med. Jour., April 3rd, 1920.
[3] Monatsschrift für Kinderheilkunde, June, 1914.
[4] Practitioner, August, 1920.
[5] Feldman: Principles of Ante-natal and Post-natal Child Physiology.

THE APPLICATION OF THE METHODS OF CORRELATION TO THE STUDY OF THE URINE.

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IN a mixture of substances such as exists in the urine it is impossible by ordinary means to determine how the different constituents are associated together so long as they are in solution. Statements are frequently made to the effect that the urine contains so much sodium chloride, so much calcium phosphate, &c., but such statements must be, for the most part, guess-work. All that can be definitely said is that the urine contains a mixture of acid and basic radicles. It occurred to me that some light might be thrown on the composition of the urine and the process of excretion by the kidney by the application of the methods of correlation. By determining the correlation between variations of any two substances we can determine whether or not they are excreted simultaneously. If, for instance, we find a positive correlation between Na and P_2O_5 we can conclude that sodium phosphate is being excreted by the kidney.

For this purpose I have made use as a basis of the valuable series of analyses made by Miss E. M. Royle (Mrs. J. B. Thomson) on the urine of cancer patients [1] (1909). Fifty-three specimens of urine from 22 patients were examined, the analyses being carried out in the pharmacological department of the University of Manchester. The means and standard deviations of the constituents are given in Table I.

TABLE I.—*Means and Standard Deviations of the Constituents.*

By residual N is meant the nitrogen not accounted for in the urea and uric acid. The amounts are stated in milligrammes per day. Ammonia, creatinin, and the acidity were not estimated.

—	Mean.	Standard deviation.	Coefficient of variation.	—	Mean.	Standard deviation.	Coefficient of variation.
Amount (c.cm.)	1000	355	35·5	Ethereal SO_3	165	83	50·3
Total N (mg.)	6340	2180	34·4	Cl	1537	837	53·8
Urea N	5657	1945	33·4	P_2O_5	836	344	41·2
Uric Acid N	132	48	36·2	K	893	419	46·8
Residual N	746	774	103·3	Na	1870	999	53·4
Total SO_3	1117	727	65·0	Ca	145	92	63·5
Inorganic SO_3	946	690	73·0	Mg	35	37	105·7

The correlation coefficients between the different constituents are given in Table II. In considering the interpretation of these coefficients we must remember that: 1. Two substances may be excreted together and thus show a positive correlation, because they are derived from the same source and arrive at the kidney at the same time—e.g., N and SO_3. 2. If a salt is being excreted there will be a positive correlation between its anion and cation. Since the blood and urine are not far removed from neutrality we must consider that the excretion of any acid radicle must be associated with a simultaneous excretion of a corresponding amount of basic radicles and vice versa, except in the case of such substances as urea, creatinin, &c. 3. If the excretion of one substance facilitates the excretion of a second substance, we should expect a positive correlation between the two. If, on the other hand, excretion of one substance hindered the excretion of a second substance we should find a negative coefficient. 4. Two substances might show a positive correlation because, owing to the similarity of their characters, they are excreted under similar conditions. Thus we should expect some amount of positive correlation between Na and K, Ca and Mg, &c. The coefficients in the table are for the most part small, but it must be remembered that we are dealing with a large number of variables, so that a small coefficient has a greater significance than where the number of variables is few.

H_2O.—Coming now to the individual coefficients, consider first the figures in the first column—the correlation between the daily amount—i.e., the water—and the other constituents. There is positive correlation with Na, K, and Cl, indicating that the corresponding salts are excreted in association with the water and hence presumably pass through the glomeruli. P_2O_5, Ca, and Mg also show positive correlation, but less in amount. Possibly in these cases the excretion is partly associated with the water, partly not. It may be that the sodium phosphate and the magnesium and calcium chlorides are thus associated, while the earthy phosphates are independent of the water. The inorganic SO_3, on the other hand, shows no correlation. It is independent of the amount of water. This suggests that the sulphates are secreted by the tubules. This method thus shows clearly the difference between sulphates and chlorides in their relation to excretion by the kidneys. The case of the ethereal sulphates is peculiar in that there is a negative coefficient indicating that the ethereal sulphates are less when the amount of urine is high, and vice versa. In the case of the nitrogenous constituents the total N, urea, and uric acid show no correlation with the H_2O, suggesting that these substances are secreted by the tubes. Residual N shows slight positive correlation, possibly due to ammonia.

Total N.—The correlation with total SO_3 is hardly as large as we should expect if these two constituents are both derived simultaneously from the breaking down of protein. The correlation with P_2O_5 is greater than with SO_3.

Urea N.—Fairly high correlation with uric acid, some correlation with SO_3, and a strong correlation with P_2O_5; no correlation with Cl. This indicates that urea is excreted in association with P_2O_5, either as urea phosphate or because the excretion of one facilitates the excretion of the other.

Uric Acid N.—Some positive correlation with residual N and with inorganic SO_3, slight with ethereal SO_3. The correlation with the inorganic bases is slight, the highest being with potassium and calcium. There is no correlation with sodium, indicating that uric acid is not excreted as sodium urate.

Residual N.—An indefinite mixture. For the most part it will include ammonia, but in some cases urea was estimated by the hypobromite method.

Inorganic SO_3.—Shows positive correlation with urea, uric acid, and with ethereal SO_3. There is no correlation with Cl, P_2O_5, or K. There is slight positive correlation with Na, Ca, and Mg.

Ethereal SO_3.—Shows no correlation with any of the inorganic bases.

Cl.—Correlated with all four of the inorganic bases, mostly with sodium. There is slight correlation with P_2O_5.

P_2O_5.—Positive correlation with urea, but none with uric acid. There is correlation with Na, Ca, and Mg, but none with K.

K.—Correlation with Cl and slight correlation with uric acid. The chloride and urate are thus suggested as the only potassium salts excreted. There is correlation with sodium and to a less extent with calcium and magnesium.

[1] Medical Chronicle, Fourth Series, 1909, vol. xvii., pp. 285, 360.

TABLE II.—*Correlation Coefficients between the Constituents of the Urine.*

—	Amount	Total N	Urea N	Uric acid N	Residual N	Total SO_3	Inorganic SO_3	Ethereal SO_3	Cl
1. Amount	..	+0·0859	+0·0837	−0·0915	+0·201	−0·151	−0·0878	−0·314	+0·618
2. Total N	+0·0859	..	+0·976	+0·610	+0·424	+0·267	+0·272	..	..
3. Urea N	+0·0837	+0·976	..	+0·527	+0·158	..	+0·251	+0·182	+0·078
4. Uric acid N ..	−0·0915	+0·610	+0·527	..	+0·306	..	+0·331	+0·232	+0·153
5. Residual N ..	+0·201	+0·424	+0·158	+0·306	..	..	+0·0407	−0·0621	−0·0520
6. Total SO_3 ..	−0·151	+0·267	..	..	..	..	+0·812	..	..
7. Inorganic SO_3 ..	−0·0878	+0·272	+0·251	+0·331	+0·0407	+0·812	..	+0·368	+0·0732
8. Ethereal SO_3 ..	−0·314	..	+0·182	+0·232	−0·0621	..	+0·368	..	−0·141
9. Cl	+0·618	..	+0·078	+0·153	−0·0520	..	+0·0732	−0·141	..
10. P_2O_5	+0·317	+0·384	+0·580	+0·0921	+0·0483	..	+0·0152	+0·0734	+0·225
11. K	+0·669	..	+0·175	+0·208	+0·0903	..	+0·0058	−0·120	+0·490
12. Na	+0·598	..	+0·0094	+0·0889	−0·0207	..	+0·175	−0·112	+0·683
13. Ca	+0·161	..	+0·145	+0·293	+0·283	..	+0·221	−0·0123	+0·351
14. Mg	+0·254	+0·187	+0·171	+0·151	−0·0155	..	+0·255	−0·0219	+0·499

Na.—Among the acid radicles correlation is most marked with Cl and P_2O_5 among the bases with Mg. There is no correlation with uric acid.

Ca.—Correlation with uric acid and residual N, slight correlation with SO_3, and stronger with Cl and P_2O_5. There is also some correlation with urea.

Mg.—Correlation follows the same course as in the case of Ca, except that there is no correlation with residual N.

Regression Equations.

By the help of the correlation coefficient between two variables and the standard deviations we can obtain an equation giving one variable in terms of the other. The equation is of the form $(X_1 - M_1) = b(X_2 - M_2)$, where X_1, X_2 are the two variables, M_1, M_2 the respective means, and b is equal to $r\frac{\sigma_1}{\sigma_2}$, r being the correlation coefficient and σ_1, σ_2 the respective standard deviations. Examples of such equations, using two variables at a time, are the following :—

(Na) = +0·802 (Cl) +638 — (SO_3 = +0·127 (Na) +708
(Na) = +1·234 (P_2O_5) +838 — (SO_3) = +1·746 (Ca) +693
(Na) = +0·253 (SO_3) +1630 — (SO_3) = +5·010 (Mg) +771

Such equations take no account of the other variables present. If we wish to allow for these the method of partial correlation can be adopted; by this means would be obtained equations of the form—

$$(X_1 - M_1) = b(X_2 - M_2) + c(X_3 - M_3) + , \&c.$$

Theoretically equations could thus be obtained giving any one variable in terms of all the others. This, however, is practically impossible owing to the immense amount of labour involved. I have adopted this method in some cases, making use of four variables. Examples of the resulting equations are as follows :—

1. (Na) = +0·727 (Cl) +0·892 (P_2O_5) + 0·0133 (SO_3) −66
2. (K) = +0·256 (Cl) −0·080 (P_2O_5) −0·018 (SO_3) +583
3. (Ca) = +0·0299 (Cl) +0·0764 (P_2O_5) +0·0262 (SO_3) +10
4. (Mg) = +0·0197 (Cl) +0·0216 (P_2O_5) +0·0133 (SO_3) −26
5. (Urea N) = −0·169 (Cl) +3·342 (P_2O_5) +0·695 (SO_3) +2466
6. (Inorganic SO_3) = +0·033 (Na) +1·033 (Ca) +2·894 (Mg) +633

In these equations the symbols in brackets represent the daily amount of the substance. The numerical coefficients on the right-hand side of the equations represent the extent to which variations in the substance to which they are attached are associated with variation in the substance on the left-hand side. From the first equation, for instance, we see that for every increase in 1 g. of Cl we may expect an increase of 0·727 g. (Na), and so on.

TABLE II.—(*continued*).

	P_2O_5	K	Na	Ca	Mg
1.	+0·317	+0·669	+0·598	+0·161	+0·254
2.	+0·384	..	..	..	+0·187
3.	+0·580	+0·175	+0·0094	+0·145	+0·171
4.	+0·0921	+0·208	+0·0889	+0·293	+0·151
5.	+0·0483	+0·0903	−0·0207	+0·283	−0·0155
6.	..	..	..	..	..
7.	+0·0152	+0·0058	+0·175	+0·221	+0·255
8.	+0·0734	−0·120	−0·112	−0·0123	−0·0219
9.	+0·225	+0·490	+0·683	+0·351	+0·499
10.	..	+0·028	+0·425	+0·350	+0·280
11.	+0·028	..	+0·350	+0·188	+0·257
12.	+0·425	+0·350	..	+0·279	+0·469
13.	+0·350	+0·188	+0·279	..	+0·390
14.	+0·280	+0·257	+0·469	+0·390	..

Summary and Conclusion.

It is not my present purpose to criticise the theories of the excretion of urine in the light of these results. Before that can be done the method will have to be applied to normal urine, and in cases of glycosuria, nephritis, excretion of drugs, &c. I have here confined myself to indicating the results of applying statistical methods to the investigation of urine. It seems probable that this method would lead to important results, but the labour involved is immense; the examination of each specimen of urine should be as complete as possible, and at least 50 specimens should be used for the calculation.

I may, however, draw attention to the chief points suggested by this investigation.

1. The results obtained appear to favour most strongly the view that certain substances (Na, K, Cl) are excreted in association with the water and hence through the glomeruli. Other substances (urea, uric acid, SO_3) are excreted independently of the water and therefore presumably through the tubules. Others again (P_2O_5, Mg, Ca) appear to hold an intermediate position, possibly being excreted by both channels. This investigation thus supports the secretion, rather than the filtration, theory.

2. The association of urea with sulphuric and phosphoric acids is an interesting point which demands further investigation.

3. There is no indication of the excretion of uric acid as sodium urate, but there are indications of calcium and potassium urates.

4. Potassium appears to be excreted almost entirely as chloride, but some urate may be present.

5. Sodium is excreted as chloride, phosphate, and sulphate.

6. Calcium and magnesium are excreted as chlorides, phosphates, and sulphates; possibly also urates. In this connexion it may be mentioned that one of the patients habitually took mist. sennæ. co. Five estimations were made on the urine, and in all the magnesium content was high. The SO_3, however, varied, being sometimes above and sometimes below the mean of the whole series. The chlorine was persistently above the mean. This suggests that the magnesium was absorbed and excreted as chloride.

7. There are no indications of the excretion of alkali salts of ethereal sulphuric acids. The negative correlation between ethereal sulphuric acid and water requires further investigation.

Clinical Notes:

MEDICAL, SURGICAL, OBSTETRICAL, AND THERAPEUTICAL.

AN UNUSUAL ACCIDENT DURING APPENDICECTOMY.

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THE following accident is very rare, and merits record.

Some months ago I was called upon to operate on a Mahommedan gentleman who was suffering from acute appendicitis. He had been given castor-oil and an enema by his medical attendant before I saw him, and I was told that the result had been satisfactory. My practice is to pick up the parietal peritoneum with a dissecting forceps, and by lateralising the edge of a scalpel, to cut it quite close to the tip of the forceps. This makes a small hole into which I pass the closed blades of another dissecting forceps and allow them to expand. I then divide the peritoneum, which is thus held away from the bowel, by a straight scissors.

In this case I followed my usual procedure, but as soon as I had cut on to the grasped peritoneum a loud report ensued and an enormous amount of gas, oil, and fæcal matter was expelled to a considerable distance. I pushed the blades of another dissecting forceps into the hole in the bowel, and when I had cleaned up the mess, I found that a knuckle of the cæcum was protruding through a small hole in the parietel peritoneum and in it a rent of about 1 inch in length. The bowel being firmly grasped by the peritoneum, none of the contents entered the cavity of the abdomen. The rent was sutured and the appendix removed. Beyond the occurrence of some suppuration in the infected abdominal wound, recovery was rapid.

Remarks.

I think that in this case the cæcum was acutely distended and the walls had become very thin, and that as soon as the pressure of the abdominal wall was relieved over a small area the bowel burst. One sees this accident reproduced in the case of a motor tyre where the outer cover has become worn through in one place and a large rent occurs in the inner tube. I am perfectly certain that I never touched the wall of the bowel in this case with my scalpel and I certainly did not incise *all* the coats of the bowel over an area of one inch. During an experience of between 1600 and 1700 operations on the appendix I have never witnessed such an accident before; I shall be glad to know if any of your readers have ever seen such a case.

Bombay.

CASE OF PUERPERAL SEPTICÆMIA; RECOVERY.

BY J. HARGREAVES ROBINSON, L.A.H. DUB., L.M.R.C.P. IREL.

THE following case is of sufficient interest to merit record.

Mrs. S., aged 25, primipara, was delivered with forceps at full term, Dec. 2nd, 1921. On the 4th a rigor, temp. 104·2° F.; uterus immediately explored with negative results; swab taken; douched with liq. sodii chlorinatæ 1 in 4. Stock vaccine given 10 million streptococci; antistreptococcus serum not then available. Ol. ricini ℥ii.; swab positive to streptococci; on the 6th diarrhœa commenced. Ol. ricini ℥ii. On the 7th 120 c.cm. antistreptococcus serum given in 30 hours in doses of 10, 20, 30, and 60 c.cm.

The midwife in attendance is the subject of onychia, and her previous case was septic, also positive to streptococci.

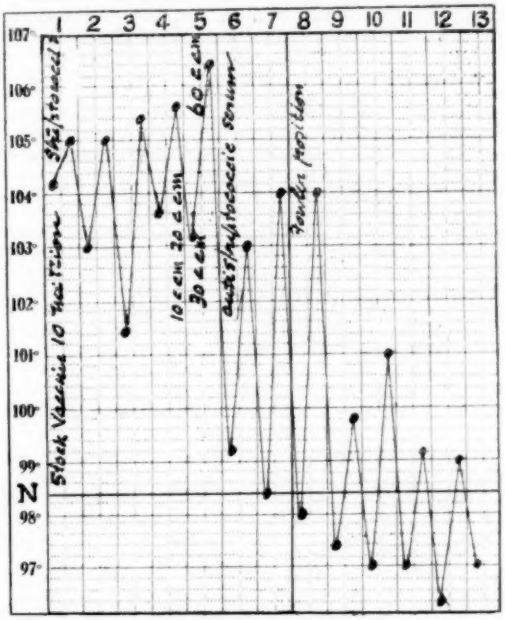

Chart showing effect of injections of anti-streptococcic serum on temperature.

Her two previous cases showed a mild pyrexia of the "spiked" type. There appears to be some evidence that the organism quickly increased in virulence by passing through a short sequence of cases. The injections of antistreptococcus serum were designedly made with a dental syringe into the muscle substance involving about 135 punctures of the skin in order immediately to obtain a very large area for simultaneous absorption. On the ninth day, as the uterus was subinvoluted, ℥ii. of liquid extract of ergot were given to lessen the risk of air-embolism.

Clinically, the large quantity of antistreptococcus serum given in a short space of time and the eccentric method of administration appeared materially to alter the outlook in a few hours when the patient was almost moribund. Four hours elapsed between the 30 c.cm. and 60 c.cm. injections.

Southport.

LITERARY INTELLIGENCE.—W. B. Saunders Company, Ltd., announce for early publication new editions of the following works: Neoplastic Diseases, by James Ewing, D.Sc., M.D., professor of pathology, Cornell University Medical School; Psycho-Analysis, by A. A. Brill, Ph.B., M.D., formerly clinical assistant in neurology at Columbia University Medical School.—Messrs. Longmans, Green and Co. announce the forthcoming publication of a book entitled Vitamins and the Choice of Food, by Mrs. Violet G. Plimmer and Prof. R. H. A. Plimmer.—Messrs. William Heinemann (Medical Books), Ltd., will shortly publish Anæsthetics in Practice and Theory, by Joseph Blomfield, O.B.E., M.D.

Medical Societies.

ROYAL SOCIETY OF MEDICINE.

CLINICAL SECTION.

EXHIBITION OF CASES.

A MEETING of this section of the Royal Society of Medicine was held on Feb. 10th, Sir WILLIAM HALE-WHITE, the President, being in the chair.

Dr. A. F. HURST exhibited a case of

Addison's Disease treated by a Suprarenal Graft.

He said that in April, 1921, the patient was seen by a number of physicians who agreed that he had in all probability only a few weeks to live. It was therefore determined to try the effect of the implantation of a human suprarenal into a part where it was likely to survive. After many disappointments Mr. W. E. Tanner was successful in obtaining a suprarenal body from a stillborn child within a very short time of death. This was implanted in the testicle. A steady improvement had taken place since the operation. The blood pressure was now 120 and the hæmoglobin amounted to 80 per cent. A nodule was palpable in the testicle where the graft had been implanted.

Dr. PARKES WEBER said that occasional improvement in all the symptoms of Addison's disease except the pigmentation had been recorded on several occasions.—Mr. W. E. TANNER referred to the difficulty of obtaining suitable material for the graft. Though these precautions had not been taken in this case, he thought the blood grouping of the donor and of the recipient ought to be ascertained, and the graft only used where the bloods were compatible. He had also been much exercised as to whether an attempt should be made to engraft the suprarenal close to one of the sympathetic plexuses.

Addison's Anæmia.

Dr. HURST also showed a case of a man, aged 63 years, who had suffered from two attacks of diarrhœa, one at Christmas, 1920, and the other in June, 1921. Following the second attack of diarrhœa he had sensation of numbness and tingling in the hands and feet. The knee- and ankle-jerks disappeared, and the plantar reflexes became extensor. He had diagnosed this case as one of subacute combined degeneration in spite of the fact that the patient did not present the blood picture of Addison's anæmia, since there was complete achlorhydria, always a precursor of Addison's anæmia.

In reply to questions by Dr. WEBER and the PRESIDENT, Dr. HURST said that between 4 and 5 per cent. of people suffered from complete achylia without symptoms. Under certain conditions—i.e., sepsis, particularly oral sepsis—these people were in danger of developing Addison's anæmia, since they were deprived of the bactericidal power of the normal gastric secretion containing HCl. They ought, therefore, to take a mixture containing hydrochloric acid for the rest of their lives.

Syphilitic Ulcer of the Tongue.

Mr. W. E. TANNER exhibited a child, aged 4 years, with a healed ulcer of the tongue. The child had been shown to the section on Jan. 14th when there was a large ulcer which had destroyed the tip of the tongue and was spreading to the frænum; the submaxillary glands on both sides were enlarged; there were no other signs of syphilis, but the Wassermann reaction was positive, as was also that of the father. Three injections of sulpharsonal (0·18 g.), combined with mercury and iodide by the mouth, had caused complete healing of the ulcer. The glands were now small and shotty. A section of a portion of the ulcer had been pronounced gummatous by three pathologists.—The PRESIDENT remarked on the interest of the case; when it was shown before most of the members decided in favour of syphilis, and the results of treatment had justified the diagnosis.

Mr. E. G. SLESINGER showed two cases of

Osteitis Deformans

affecting one bone only, and a number of X ray photographs of unusual cases. Of the two cases shown one was a woman in whom the skull alone was affected, and the other a man whose right tibia alone was affected.—In reply to questions by Dr. WEBER, Mr. SLESINGER said that there appeared to be more pain in the cases in which a single bone was affected, and also that he had not tried linear osteotomy for these cases since he had found treatment with a walking calliper gave sufficient relief. All these patients seemed to derive benefit for a short period from any form of treatment, but such benefit was transitory.—Dr. BERNARD MYERS said that he had a patient with osteitis deformans associated with acromegaly, whom he was treating with thyroid and pituitary extract with considerable benefit.

Mr. MAX PAGE exhibited a case of

Spondylitis Deformans.

The patient had been in hospital for dysentery in Malta during the war, after which the deformity came on by slow degrees. He had been given rest, baths, and various forms of electrical treatment without benefit. When Mr. Page first saw him he had a fixed kyphotic spine; the hips were permanently flexed, so that he was only able to walk with extreme difficulty by the aid of two sticks with the back bent at a right angle to the thighs. Mr. Page reduced the deformities by manipulation with only transitory benefit. He then performed an arthroplasty of the right hip and an arthodesis of the left, straightened the back and kept it straight for six months while the patient remained in bed. As a result the patient could now walk erect.

A Mandibular Swelling for Diagnosis.

Mr. W. W. WAGSTAFFE exhibited a female, aged 18 years, suffering from a swelling of the left side of the mandible. The swelling was first noticed four months ago owing to the asymmetry it caused in the face. Two months ago the swelling became noticeable inside the mouth. Two molars which were loose were then removed, as it was suggested that the swelling might be a dental cyst, but the teeth proved to be in every way normal. The patient had now been under his observation for three weeks, during which she had not complained of pain and the swelling remained unaltered. There was some ulceration over the swelling of the jaw, extending on to the cheek. The swelling was not tender and did not give egg-shell crackling. There were no palpable glands. An X ray plate (which was exhibited) showed enlargement of the jaw bone at the angle extending into both the horizontal and the vertical rami. The radiographer suggested a dental cyst as the diagnosis, and Mr. Wagstaffe asked for suggestions as to diagnosis and treatment.—Mr. PAGE suggested the removal of a portion of the tumour for microscopic examination.

Dr. MAURICE CASSIDY exhibited a case of

Auricular Fibrillation.

The patient, now aged 34, joined the Metropolitan Police in 1909, and had no serious illness since joining. He was seven days on the sick-list in 1918, suffering from influenza, and thinks that he resumed duty before his convalescence was complete, but no cardiac irregularity was noticed at the time. In January, 1920, he went sick, complaining of lumbago, and auricular fibrillation was then discovered and proved by the electro-cardiograph. Apart from very slight shortness of breath on hurrying upstairs, there has at no time been any symptom of cardiac failure, and the patient has always maintained that he is unaware that there is anything wrong with his heart. He resumed duty in June, 1920, and has done full police duty since without a day's sickness. Dr. Cassidy said that he showed this case because he felt that we were apt to take too jaundiced a view of auricular fibrillation. Sir Thomas Lewis had suggested that fibrillation without signs of cardiac failure constitutes a 50 per cent. disability. Dr.

Cassidy considered that his patient was evidence against this contention. He know also of another man with auricular fibrillation who had remained on ordinary police duty for three years without any but trivial ailments, and who, after retirement on reaching the age-limit, still enjoyed good health. Another subject of auricular fibrillation was able to walk 12 miles a day and to climb mountains at least as well as the average untrained townsman.

Mr. R. P. ROWLANDS exhibited a patient illustrating

The Advantage of Cholecystectomy over Cholecystostomy.

The patient, a stout man, aged 53 years, had had a cholecystostomy in August, 1921, when a number of stones were removed from the gall-bladder. His convalescence was protracted and he was subsequently readmitted to hospital for a return of symptoms, which, however, abated. In January, 1922, after he had had a fresh attack of pain in the right hypochondrium associated with slight jaundice, he consulted Mr. Rowlands, who advised operation. On Jan. 16th Mr. Rowlands operated, employing Kocher's incision, and exposed the gall-bladder after encountering considerable difficulty from adhesions. A small stone felt in the cystic duct was removed; the common bile-duct was opened and explored with an olive-headed probe, as were also the right and left hepatic ducts. No stones were encountered. Mr. Rowlands therefore decided to remove the gall-bladder, which he did with great difficulty. Only after the gall-bladder had been removed was it discovered that there was another small stone in the cystic duct. Mr. Rowlands maintained that this case exhibited the advantage of cholecystectomy over cholecystostomy, and that the former operation should be performed whenever possible for the following reasons: (1) It was the only means of removing the source of gall-stones—the infected wall of the gall-bladder; (2) it eliminated the risk of carcinoma; (3) a small stone in the cystic duct might easily be overlooked; (4) ulceration followed by stricture of the duct after cholecystostomy might cause empyema of the gall-bladder with rupture and subphrenic abscess (as had occurred in the case shown); and (5) a mucocele or chronic empyema might form with secondary pylephlebitis or portal pyæmia. Cholecystectomy should, of course, only be performed when it was certain that the common bile-duct was patent. Many acute cases could only be treated by cholecystostomy at the first operation, but even in these cases a secondary cholecystectomy was, in Mr. Rowlands's opinion, advisable.

Mr. TANNER agreed with Mr. Rowlands, but thought that cholecystectomy was an operation for the expert. Its employment as a routine by less expert surgeons would result in a high mortality.—Dr. CASSIDY had seen fatal jaundice follow the operation of cholecystectomy. Post-mortem examination in this case revealed a stricture of the common bile-duct. Had cholecystostomy been performed the patient would probably have lived.—The PRESIDENT remarked that as a rule unsuccessful surgical cases came to the physician; and in the course of his experience he had encountered only two unsatisfactory results following the operation of cholecystostomy.—Mr. SLESINGER said that a point against cholecystostomy not sufficiently realised was that a secondary infection of the gall-bladder from the exterior not infrequently took place through the drainage-tube. Drainage of the gall-bladder also caused contraction of the organ very often with the formation of fresh stones. Secondary operations on these cases proved very difficult.

Mr. ROWLANDS said that Dr. Cassidy's case might have been relieved by draining the common bile-duct or permanently cured by anastomosing the dilated proximal part of the duct to the duodenum—not a very difficult operation. In this case the stricture of the duct was probably due to injury during the operation of cholecystectomy. Injury to the right hepatic duct might also occur when the operation was performed by a surgeon who was not expert.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.

A MEETING of this Society was held on Feb. 17th at 1, Upper Montague-street, W.C., with Dr. W. J. HOWARTH, the President, in the chair, when Prof. Sir FREDERICK W. ANDREWES, F.R.S., read a paper on

The Application of Bacteriological Studies to the Prevention of Diphtheria.

He said that we perhaps knew more about the pathology of diphtheria than about that of any other common zymotic disease. During the past 30 years, bacteriology, the hand-maiden of public health, had shed on it unnumbered blessings in respect to this disease alone. Its diagnosis now left little to be desired in the hands of a competent bacteriologist; we had fairly clear ideas on its mode of spread and the carrier condition; and our knowledge of its immunology had given us a powerful curative serum and had indicated a practical method of preventive immunisation. The speaker said he knew of no reason for denying that the bacillus was the *vera causa* of the disease, and a specific entity which could not be transformed. It was recognisable with such certainty, and the bacteriological reports of experienced workers were so reliable, that there was a regrettable tendency for the clinician to pass the responsibility of diagnosis on to the bacteriologist. This often caused inexcusable delay in the administration of antitoxin. The diagnosis of the disease was the responsibility of the physician, and the recognition of the bacillus was one datum only. It could be made on clinical grounds alone in at least half the cases of diphtheria. The disease was purely toxic, and usually did not owe its terrors, like scarlet fever, to secondary infections; and the defence of the body was an antitoxic one, whether prophylactic or curative; serological strains had been differentiated, but they produced a common toxin, and there seemed to be no more hope of improving a serum by making it polyvalent than by making it anti-bacterial. The susceptibility of the patient was more important than the virulence or toxicity of the bacillus. Various strains differed greatly in toxicity, though his own experience was that a freshly isolated strain was either markedly toxic or wholly non-toxic. The non-toxic bacillus was otherwise indistinguishable from the toxic, and it now appeared very doubtful whether they ever regained their toxicity or became epidemiologically dangerous. In the recognition of susceptibility there had been important advances in the past decade. Simple cutaneous tests, of which the first was devised by Römer and the second by Schick, enabled us to determine the antitoxin content of the blood. It appeared that 1/50 unit per c.cm. conferred immunity. Published figures, mostly dealing with the poorer classes, showed that 80 per cent. of infants at birth had a passive immunity derived from their mothers, which quickly faded, till at three years of age the figure was 28 per cent., which rose again to over 80 per cent. at 18 years and in adult life. Cases of active diphtheria (*ipso facto* not immune) always gave a positive Schick reaction, and chronic carriers negative. It had long been known that a temporary immunity could be conferred by the injection of antitoxin, but it had now been established that a more enduring protection could be achieved by active immunisation with toxin to which sufficient antitoxin had been added to prevent untoward results. It took some few weeks for its development, but involved no undue risk or discomfort.

Prof. Andrewes then considered the means at the disposal of public health in combating the disease. Mere sanitation appeared to offer no solution, the proportion of immunes being actually least in those higher in the social scale. Present machinery was inadequate for discovery of virulent carriers in the community as a whole, for their isolation, and for the

cure of the condition in all cases. The problem of the undiagnosed case called for better education both of the public and of the doctor. From the point of view of prevention by immunisation rather than by the prevention of the spread of infection, we now had an effective method, so far as concerned the individual, in the injection of toxin-antitoxin. Up to the level of the institution the problem of the prevention of diphtheria was solved, if we chose to use the means at our command; but this was not true in dealing with the community as a whole. Prevention by removal of infection only might defeat itself by the production of a population having no resistance to diphtheria. The method of active immunisation would involve the Schick testing of young children and injection of the positives. The immunity conferred was fairly lasting and probably persisted after antitoxin had disappeared from the blood, the earliest stimulus of a commencing infection re-awakening the dormant machinery of antitoxin. Our experience of the Vaccination Acts did not encourage advocacy of legal compulsion. The speaker put forward an interesting speculation whether, if the whole community were made immune, the bacillus, condemned to an existence of helpless saprophytism, might not degenerate into a relatively harmless atoxic form.

Discussion.

The PRESIDENT, in thanking Sir Frederick Andrewes for his paper, remarked that it threw great light on the problem why diphtheria was less prevalent in school communities in poor neighbourhoods than in the better-off schools in epidemic times. He said that he hoped shortly, at a residential school in the City of London, to put the Schick test and prophylactic injections into operation, and to invite medical practitioners in the City to witness the work. Assuming that immunity produced by toxin-antitoxin injections lasted a considerable time, what, he asked, was the process that accounted for this, considering that the material injected and the antitoxin produced would only exist in the system for a limited time.

Dr. R. J. EWART (M.O.H., Barking) objected to the use of the word "carrier." He said that if 2 per cent. of children in a school exhibited the germ at any one time, and if the condition lasted for an average of three months in each individual, then at some time or other in its life every child would show the bacillus. The essential feature of the disease was the spread of the germ in *healthy* persons. Discomfort or death was merely an accident in the process, no more advantageous to the bacillus than to the host. If we could check this spread by isolation, &c., we should be in a similar position to that of the Faroe Islands in 1760, when after the population had been free from scarlet fever for one or two centuries, one-half the people died from a chance introduction of that disease. The only hope seemed to come from the Schick reaction and active immunisation.

Dr. A. T. NANKIVELL (M.O.H., Hornsey) asked if there were no serious risks in the injection of toxin-antitoxin, especially to those already immune. It was not practical politics to go round a school with a hypodermic syringe and inject every child on several occasions. The interpretation of Schick results was sometimes difficult, and he referred to a pigmentation of the skin which followed the positive reaction. With regard to the remissness or ignorance of some doctors in connexion with diphtheria, he had decided, with the concurrence of his council, to advise the coroner in cases where a fatality seemed to be the result of these causes.

Rear-Admiral Sir PERCY W. BASSETT-SMITH said that an experiment on the lines under discussion was in progress now at the Greenwich Hospital School, where there had been persistent diphtheria. The parents of all the 1000 boys had been written to for permission to inject, and there had only been 40 refusals, nor had there been any resentment on the part of the boys. Pigmentation following positive reactions had been observed.

Dr. F. H. THOMSON (M.A.B.) urged the importance of clinical diagnoses being acted on promptly, without waiting for bacteriological confirmation. The evil had become worse of late. The mortality when antitoxin was injected during the first 12 hours of the disease was nil. It was most important to teach medical men who do not usually know their diphtheria well.

Dr. A. J. EAGLETON (Wellcome Research Laboratories) said that he and his colleague, Dr. O'Brien, had found measurement with a millimetre scale useful in distinguishing positive from negative Schick reactions. Doubtful reactions could readily be cleared up by examination of the blood for antitoxin content: 2 or 3 c.cm. of blood were required, and the result was available in two or three days.

Dr. C. C. OKELL (Wellcome Research Laboratories) exhibited some actual Schick reactions.

Dr. J. FENTON (M.O.H., Kensington) said that he was sending positive carriers into the M.A.B. hospitals, and questioned what could be done with them if this were not done.

Dr. G. CLARK TROTTER (M.O.H., Islington) strongly deprecated the suggestion that the help of the coroner should be invoked in connexion with the treatment of diphtheria cases by medical men. He hoped for much benefit from the use of the Schick reaction.

Dr. A. B. MCMASTER (M.O.H., Dover) emphasised the necessity of educating the parent in the need for calling in the doctor early. The child was not always very ill in the early stage of diphtheria. He had found less infectious disease in certain dirty schools than in clean schools. Nasal diphtheria he regarded as an important cause of the spread of the disease, and he was in favour of the admission to hospital of carriers.

Dr. J. G. FORBES (L.C.C.) spoke of the value of the virulence test in dealing with carriers. They had found 50 per cent. of such were avirulent, and these were admitted to school without harm resulting.

Sir FREDERICK ANDREWES, in his reply, agreed that experience was required in interpreting Schick reactions. The injection of toxin-antitoxin might be dangerous unless it were prepared by persons of the highest skill. Fatal cases had occurred abroad. There were only a few people really competent for this work, and if the procedure were carried out on a large scale a scheme of State control would be necessary.

WEST LONDON MEDICO-CHIRURGICAL SOCIETY.

A MEETING of this Society was held at the West London Hospital on Feb. 3rd, Sir GEORGE LENTHAL CHEATLE, the President, being in the chair.

A paper, illustrated by radiograms and plaster casts, was read by Mr. H. A. T. FAIRBANK entitled

Flat-Foot and Some of its Complications.

He began by discussing the progress made in recent years in the treatment of ordinary cases of flat-foot. In children flat-foot arose as a result of congenital deformity, muscular weakness, or absence of the normal reflex postural activity of the muscles supporting the foot. In adults overwork or weakness were two of the causative factors of ordinary flat-foot. He drew attention to the work of Sherrington and others on "postural activity" of the anti-gravity muscles; failure of this activity might account for the development of static flat-foot. Re-education of the reflex was necessary for its cure. Pain was absent in children and most adolescents, and in these subjects a cure was usually possible. In adults as a rule relief of symptoms only could be hoped for. Mr. Fairbank spoke of the satisfactory results obtained by electrical stimulation of the muscles, especially by Dr. Murray Levick's method in which the tone of the small muscles of the foot was re-established. This treatment should be combined with suitable exercises, every effort being

made to interest the patient in his treatment, the "mental effort" on his part being an all-important factor. In children the inner side of the sole and heel of the boots should be wedged up, the inner side of the "upper" should be stiffened. In adults electrical treatment often gave marked relief of pain, but in addition in these cases "sole-plates" were usually necessary. These plates should be made for each individual, plaster casts being taken and carved up suitably after Trethowan's method, which Mr. Fairbank described and demonstrated in detail. In children contracture of the calf muscles was an occasional complication. This could be overcome in milder cases by stretching, while tenotomy of the tendo Achillis might be necessary in the severer forms. Osteo-chondritis of the heel epiphysis and that of the tubercle of the navicular were among the causes of painful flat-foot in children. The pathology of the condition was similar to that of Schlatter's knee. Köhler's disease (isolated disease of the navicular) was another cause of pain in children. Lastly, Mr. Fairbank drew attention to the frequent development of flat-foot after convalescence from illnesses necessitating prolonged confinement to bed, the absence of reflex postural tone accounting for this.

Mr. W. MCADAM ECCLES said that all infants were born with poorly-developed longitudinal arches, the arch developing as the child grew. Flat-foot in children was, therefore, more often due to non-development of the arch than to subsequent flattening. He agreed with Mr. Fairbank as to the efficacy of electrical treatment and as to the frequent development of flat-foot during convalescence from long illnesses. He had seen a number of cases of epiphysitis of the proximal end of the first metatarsal bone in lads about 12 years of age, the subjects of flat-foot.

SOUTH-WEST LONDON MEDICAL SOCIETY.

A MEETING of this Society was held at the Bolingbroke Hospital on Feb. 15th, Dr. E. J. PRITCHARD, the President, being in the chair, when Mr. W. H. C. ROMANIS gave an address on

The Surgical Aspect of Gastric Ulcers.

He said that gastric ulcers may be acute and chronic, and these might almost be called the woman's and the man's ulcers. The acute ulcer is rare and is not as a rule a surgical disease, as it should be cured by efficient medical treatment. Chronic gastric ulcer is far more serious and difficult to treat. Its cause was not definitely known, but it was most probable that in the majority of cases there was a primary infective focus somewhere, when success in treatment depended on the removal of this primary focus in addition to the treatment of the ulcer.

Recurrences after medical treatment were frequent and a recurrence of symptoms with the history of a previous attack must be regarded as an indication for surgical measures, as was also a severe hæmorrhage. The operation should be performed as soon as the hæmorrhage had stopped, provided the patient was in a condition to stand it. Hæmorrhage from the stomach in a male had a more serious significance than the same symptom in a woman. Mr. Romanis said that the nature of the operation to be performed must depend on the nature and situation of the ulcer. For ulcers in the pylorus or near to it gastro-enterostomy was the operation of election, the risk being negligible and the results excellent. For ulcers in the central portion of the stomach and on the lesser curvature, gastro-enterostomy was not so useful, and here probably partial gastrectomy gave the best results. The various methods of local excision, though there is, of course, a very definite mortality attached to it. Those rare ulcers far away to the left-hand side of the stomach were best treated by D. C. Balfour's operation of excision with the cautery suture and gastro-enterostomy. Adhesions of the ulcer to the neighbouring organs, such as the liver and pancreas, were indications in favour of partial gastrectomy if possible. For the first four months after an operation the patient had to be strictly dieted, to abstain from overwork, and to take great care of the alimentary canal.

LONDON ASSOCIATION OF THE MEDICAL WOMEN'S FEDERATION.

A MEETING of this Association was held on Feb. 4th at the Elizabeth Garrett Anderson Hospital, when the President, Dr. LOUISA MARTINDALE, was in the chair.

Prof. LOUISE MCILROY spoke on

Some Complications of Pregnancy and their Influence upon Infant Mortality.

She pointed out that the spread of antenatal clinic work has opened up a possibility of dealing with such complications at an early stage; general medical treatment should obviate many of those complications due to toxæmia and similar conditions. She regretted the fact that as yet there exists no system of training midwives in antenatal work, and urged that more facilities for obtaining laboratory reports on specimens should be provided. She then discussed two types of complications of pregnancy: (*a*) contracted pelvis, and (*b*) toxæmic conditions and their treatment. In dealing with the treatment of pelvic contraction stress was laid upon the necessity for ascertaining the relationship of the head to the pelvis rather than the dependence upon actual measurement of the pelvis itself. Prof. McIlroy said that induction was seldom advisable before the thirty-sixth week in the interests of the child. Cæsarean section was still an operation associated with danger to the mother, and should not be lightly undertaken. The future of obstetrics lay in antenatal supervision, and by this means many of the diseases of pregnancy could be prevented, and also much of the operative interference at the time of labour. The application of forceps was associated with risks to the child's future welfare, except in cases of flat pelves where the head was retained in the cavity of the pelvis owing to defective expulsive forces. The toxæmias of pregnancy included abortions, premature death of the fœtus, and hæmorrhages. Accidental hæmorrhage would in time be prevented by careful antenatal supervision; post-partum hæmorrhage also owed its origin in some cases to a condition of toxæmia. The early phenomena of pregnancy, such as vomiting, were not physiological conditions, but were due to the retention of toxins and to the upsetting of the balance of the internal secretory organs, their adjustment being affected by the newly introduced ovum, which acted temporarily as an internal secretory organ. More laboratory work was required to aid clinical diagnosis and prognosis in cases of toxæmia.

In the discussion which followed Dr. F. HUXLEY, Miss M. BASDEN, Miss E. BOLTON, Lady BARRETT, Lady BRISCOE, the PRESIDENT, and others took part.

LIVERPOOL MEDICAL INSTITUTION.

A MEETING was held on Feb. 2nd, with Dr. J. HILL ABRAM, the President, in the chair.

Dr. C. O. STALLYBRASS described a case of Exanthem Subitum, drawing attention to the clinical picture and epidemiology.

Dr. H. S. PEMBERTON read a short paper on

Diet in Nephritis.

He contended that the maintenance of adequate nutrition should always be recognised as one principle in the management of chronic renal disease. The question of diet might be considered from two aspects: receptive and eliminating. There were certain changes in the receptive side (gastro-intestinal mucosa and portal system) often associated with chronic nephritis, and unless these were recognised, the diet might prove inadequate from non-renal causes. Changes on the

eliminating side were often directly associated with renal disease, the degree of which might be determined by clinical or biochemical means. The fate of known diets might in part be investigated by means of the renal test-meal, combined with estimations of blood-urea and total nitrogen content of the urine. Many renal cases—irrespective of type—were still deprived of proteins. Those which needed proteins appeared to be: (1) cases of albuminuria without retention of nitrogen; (2) cases with or without albuminuria which retained nitrogen, but did not show an elevation of the normal blood-urea content; (3) certain anomalous cases where the amount of protein which could be tolerated was only determinable by trial. Proteins would seem inadvisable in cases which showed high blood-urea concentrations, and hence one of the most generally useful controls on dietetic management was periodic estimation of the blood-urea content.

Mr. K. W. MONSARRAT read a paper entitled

The Peptic Ulcer.

He reviewed records of the 48 cases on which he had operated during 1921, of which 41 were men and 7 women. In 34 instances the ulceration was gastric, in 8 duodenal, and in 6 jejunal. 25 of these cases had been treated by partial gastrectomy and to the indications for this operation Mr. Monsarrat particularly directed attention. There had been no mortality among the cases under his care, and he considered that the operation was well borne. Certain cases were suitable for sleeve resection, but for the greater number of inveterate ulcers the Polya operation was the best procedure. He preferred the posterior Polya operation and had not met with the stenosis which had led other surgeons to prefer the anterior operation. He discussed the relations between functional disturbances of the pyloric mechanism and the incidence of ulcers. He considered that the basal condition of the ætiology of ulcer was the disturbance in the normal correlation between gastric and pancreatic secretion.

BRISTOL MEDICO-CHIRURGICAL SOCIETY.

A MEETING of this Society was held on Feb. 8th, with Mr. CYRIL H. WALKER, the President, in the chair, when a discussion on the

Treatment of Fractures

was opened by Mr. HEY GROVES, who confined his remarks chiefly to consideration of the rôle of X rays in the diagnosis and treatment of fractures, and to the classification of cases suitable for different types of treatment. He urged that every case of serious injury should be submitted to X ray examination at the earliest possible moment, in order to detect the presence of a fracture where it might otherwise be overlooked, and to recognise the exact nature of the fracture in order to determine both treatment and prognosis. The system in common practice of treating cases of injury for several weeks without accurate diagnosis by X rays, and of employing the latter only when matters had evidently gone wrong, was strongly condemned by Mr. Hey Groves on the grounds that it led to irreparable damage of function, and laid the practitioner open to serious legal liability. In considering the classification of fractures with a view to treatment he suggested three great classes: first, those in which a very simple type of treatment was sufficient, this class being made up chiefly of children, and adults with fractures with little or no displacement; secondly, those cases in which a good functional result could never be expected—for example, in aged, infirm, or lunatic patients, in whom it was wise to be content with the simplest methods of treatment; and thirdly, there remained the great class of fractures with marked displacement in vigorous adults, where a rapid restoration of function ought to be the object aimed at. In the attainment of this object the most universally reliable method was some form of traction, and Mr. Hey Groves then proceeded to demonstrate how this could be carried out by means of such contrivances as Thomas's splint, Pearson's bed, and his own cradle-splints with callipers or transfixion pins.

Mr. R. G. P. LANSDOWN spoke of the advantages of a special fracture department, on the ground that such a department would raise the general standard of knowledge of the subject. In favour of this argument he quoted the experience of the war, which had taught surgeons to segregate their cases of fracture for the sake of enhancing the efficiency of treatment. The ancillary services of massage, electro-therapy, and physical exercise were also better organised if they were coördinated under one director. Finally, such concentration made for improvement in the teaching offered to students.

Dr. J. J. S. LUCAS spoke of the difficulties attending the treatment of fractures in general practice. The view that skiagrams should be taken in every case of possible fracture was difficult to apply in practice because of the economic factor. He urged some provision for the middle-class patient who could not easily pay the full fee for a skiagram, but on the other hand objected to accepting gratuitous services. For such patients, also, long courses of massage were difficult to arrange, and he found it advisable to let a skilled masseuse initiate the course, completing it by directing some relative of the patient how to follow on the treatment.

Mr. HUBERT CHITTY gave some account of fractures of the lower end of the humerus in children, which, he said, were usually due to a fall on the hand and involved a separation of the lower epiphysis of the humerus. He described the chief clinical features and dwelt on the risk of ischæmic paralysis involved by faulty correction. Massage should be begun early, but movements, both active and passive, deferred till later.

Mr. CLIFFORD A. MOORE said that cases should be selected for operation with the greatest care, since there was a certain inevitable risk of sepsis, partly due to the forcible manipulations requisite in a majority of cases. The operative treatment of fractures was a matter for specially skilled surgeons.

Mr. W. J. GREER deprecated the use of the fluorescent screen; skiagrams should always be taken. In only about 1 per cent. of fractures of long bones did he find open operation necessary. He condemned unreservedly the use of Liston's splint and plaster of Paris, and spoke with enthusiasm of Lambotte's technique.

Mr. HEY GROVES replied.

WEST KENT MEDICO-CHIRURGICAL SOCIETY.

A MEETING of this Society was held in the Miller General Hospital, Greenwich, on Feb. 10th, with Dr. C. T. T. COMBER in the chair.

Dr. C. O. HAWTHORNE gave an address on

Some Pulse-Tracings and Their Meanings.

He said that he preferred the terms sphygmometer readings and sphygmograph tracings to the use of the term blood pressure. The sphygmometer gave the pressure required to obliterate the brachial pulse, whilst the sphygmograph showed whether the pressure was well or ill sustained. He showed tracings from books labelled high blood pressure and low blood pressure, and tracings from his own cases which controverted these ideas, suggesting that the sphygmograph does not give proper conception of what the sphygmometer reading will be. He thought the tidal wave, shown in tracings with pressure well sustained, was due to the inertia of the button of the instrument, comparing it to a pea on the inside of a tambourine, which, when flicked, gave a greater excursion than the membrane. He said that if the pressure is sustained the button falls on the artery before it has contracted and thus shows a wave. If the artery has contracted earlier, no wave appears. Dr. Hawthorne agreed that the dicrotic wave was due to the closure of the aortic valves. There was no change in the peripheral circulation in some cardiac diseases if compensation was adequate, and so nothing was shown by the sphygmograph. In his opinion digitalis did not raise the blood

pressure and was not cumulative in effect. He did not believe the hypodermic injection of digitalin did any good. Digalen intravenously was efficacious. When vomiting occurred with digitalis he used Nativelle's digitalin.

SHEFFIELD MEDICO-CHIRURGICAL SOCIETY.

A MEETING of the Pathological Section of this Society was held in Sheffield University on Feb. 9th, Dr. GODFREY CARTER, the President, in the chair, when Dr. A. G. GIBSON read a paper on

The Pathology of Epilepsy.

He urged that an attempt should be made in every case of epilepsy to discover a definite cause, and that if such an attempt were sufficiently painstaking a large number of so-called idiopathic cases would be found assignable to some organic disease. Among such organic causes of epilepsy Dr. Gibson drew attention to circulatory changes and instanced the seizures that occur in the course of Stokes-Adams disease. He pointed to the interesting connexion between epileptiform convulsions and the infectious fevers, and laid stress on the importance of syphilis as an ætiological factor in the production of the disease. He said that amongst the causes of epilepsy are found such definite entities as parasite disease—e.g., cysticercosis of the brain. The term "idiopathic" should not be used when dealing with epilepsy until every possible source of recognisable ætiology had been excluded and he thought that the simple administration of bromides in the treatment of this disease until these avenues had been explored, was to be deplored.

In the discussion which followed Prof. A. J. HALL, Dr. A. E. BARNES, Mr. E. F. FINCH, and others took part.

ROYAL MEDICO-CHIRURGICAL SOCIETY OF GLASGOW.

Rickets in India.

A MEETING of this Society was held on Feb. 3rd, when Dr. HARRY S. HUTCHISON gave the following account of his investigations in the town of Nasik, Bombay Presidency. Here there are two distinct classes of the population: Class 1, chiefly Brahmins, well-to-do Hindus, and well-to-do Mohammedans; and Class 2, lower caste and poorer Hindus, poor Mohammedans, and social outcasts. The general conditions in both are the same, but they differ in that Class 1 maintains purdah, or the close seclusion of women and children during part of their lives. This class has a good and rich dietary, whereas Class 2 has no purdah, and eats a poorer dietary. All children are breast-fed for at least a year; in Class 1 this is supplemented with cow's milk at the age of 7 or 8 months, and in Class 2 with rice, and seldom with milk. The mothers of Class 1 eat a dietary containing more vitamin-A than those of Class 2, and therefore it would appear that the children in Class 1 get more vitamin-A than those in Class 2. The incidence of rickets was found to be much more common in the Brahmins and well-to-do Hindus in Class 1; less so but still marked among Mohammedans, partly in Class 1 and partly in Class 2; slight in other Hindus, all in Class 2. Of 1073 children of purdah mothers there were 268 cases of early rickets active or healed (24·9 per cent.), and of 2305 children of non-purdah mothers 113 cases (4·8 per cent.). Seventeen cases of late rickets were seen. All occurred in females; 16 cases were Brahmins, well-to-do Hindus, and Mohammedans; only one case was in a lower-caste woman, although many more of these were seen. In practically all the cases milk and ghee were consumed daily, and frequently a cow was kept. The mean age of incidence was 15·6 years, the majority being between 12 and 13 years.

Dr. Hutchison discussed his results with regard to the ætiology of rickets, and concluded that in his cases the presence of quantities of vitamin-A seemed to be unavailing in preventing the onset of rickets in the classes referred to, whereas in the poorer classes without such quantities the plentiful supplies of fresh air and sunlight very largely prevented its incidence. Cases of active rickets treated by fresh air and sunshine improved rapidly.

Rickets—the Part Played by Unhygienic Social Conditions in Predisposing to the Disease.

Prof. NOËL PATON made a communication on this subject, the substance of which was as follows:—Two factors predispose to the onset of rickets—unhygienic surroundings and defective feeding. Recently an attempt has been made to prove that it is *caused* by the absence of a hypothetical anti-rachitic factor, probably identical with the fat-soluble A substance. The author of this contention has now abandoned this view, and has reverted to the long-accepted theory that various errors of diet predispose to rickets. The evidence of the influence of social conditions has received scant attention from those who maintain the causal relation of the dietary factor to this disease. Rickets is common among the poorer classes of our Northern towns, where they are housed in high tenements, defective in light and ventilation. The condition of the house depends largely upon the health and habits of the mother, as does the extent to which the young children are taken out. A table was shown proving that in Glasgow, at least, the incidence of rickets is more directly associated with the condition of the home, with maternal care, and with overcrowding than it is with dietary. Between families with rickety children and those without the differences in the food are small. It has been argued that the absence of rickets among the people of Lewis, who live in the so-called black houses, strongly supports the view that insanitary conditions of housing have nothing to do with a predisposition to the disease. An investigation of the housing, mode of life, and of the diet of 18 typical families in the island has been made, and the results show: (1) that the average air-space and ventilation of the black houses is better than that of the rachitic families in Glasgow, and (2) that the children are taken out when quite young, and that after they can walk they are constantly out of doors. The development and nutrition of the children show an average well above that of the rest of the British Isles, teething is early, and generally the infants walk at an early age. Only one case of doubtful rickets among 81 children was observed. The diets were ample, and the chief articles of diet were fish, milk, oatmeal, and potatoes. The condition of these people, not only as regards diet, but also as regards housing and mode of life, are such as to increase their resistance to the onset of rickets. Prof. Paton stated that his studies of rickets have led him to the conclusion that the unhygienic conditions of life and defective diet are no more the causes of rickets than they are of tuberculosis or typhus. They merely predispose to these diseases. Whether rickets will be proved to be an infective process remains to be seen. Its association with slum life, its frequent incidence in several members of a family, and the record of an outbreak among foxhound puppies, checked in the case of some by removal to new kennels, suggest this possibility.

TUBERCULOSIS SOCIETY.—A general meeting of this society will be held at the Margaret-street Hospital, Margaret-street, London, W. 1, on Monday, Feb. 27th, at 7.30 P.M. Dr. F. Hernaman-Johnson will demonstrate X ray apparatus, discuss technique and difficulties, and will show plates.

MENTAL AFTER CARE ASSOCIATION.—The annual meeting will be held to-day, Friday, Feb. 24th, at 3 P.M., at the Apothecaries' Hall, Water-lane, Blackfriars, London, E.C., Dr. W. F. R. Burgess presiding. Sir Claud Schuster, Sir John Goodwin, Mr. C. Marriott, Mr. L. L. Faudel-Phillips, and Dr. C. H. Bond will speak.

Reviews and Notices of Books.

SOUTH AMERICA FROM A SURGEON'S POINT OF VIEW. By FRANKLIN H. MARTIN, C.M.G., M.D., F.A.C.S. London, Edinburgh, New York, and Chicago: Fleming H. Revell Company. 1922. Pp. 325.

THIS book is a compilation of notes made during two visits to South America undertaken in 1920 and 1921, on behalf of the American College of Surgeons, by Dr. Franklin Martin, the first visit being made in company with Dr. William J. Mayo of Rochester, then President of the College, and the second in company with Dr. Thomas J. Watkins of Chicago. The first itinerary included Jamaica, Panama, Peru, Chile, Argentina, and Uruguay; the second was a repetition of the first, with the addition of Brazil. Included in the book, which is, as the author explains, a report to the American College of Surgeons, are the observations of Dr. Francis P. Corrigan, who at the time of Dr. Martin's second journey was surveying medical conditions in Ecuador and Bolivia. Dr. Martin has also availed himself of excerpts from articles by his own companions, so that the book contains considered opinions given by four Americans of high standing in their profession concerning the medicine and surgery of the southern half of the American continent. The visits were made in a professional capacity, with the object of furthering the process of affiliation of the surgeons of Latin America with the College; the cordial reception and distinguished hospitality afforded them by the governments of the various countries, and by members of the medical profession in each city visited, obviously made a deep impression on the writers, as did the dignity of the great modern cities, and the natural beauty, climatic advantages, and economic possibilities of much of the land they traversed. A brief but impressive picture is given of the Panama Canal Zone, the remarkable State which owes its existence to the political foresight of Roosevelt, the pathological genius of Gorgas, and the engineering ability of Goethals; and due emphasis is laid upon the fact that the severing of the northern and southern continents has drawn them more closely together.

In his general observations on the medical profession in South America, Dr. Watkins remarks on the wide reading of many of the medical men, all of whom seem to know two or three languages at least; many work hard and sustain a keen scientific interest under climatic conditions which would severely tax the North American. Dr. Mayo regards the South American surgeons in their hospitals and operating rooms as equals of any representative group of scientific workers in the world. The estimate gives force to his view that wise opportunity exists for exchange of professors and students, with benefit to all concerned, between the two Americas. This would be with particular reference to diseases having surgical complications, which have been hitherto known as "tropical," in the sense that they existed only in the tropics until improvements of transport introduced them to more temperate climates. Speaking of the hospitals generally, Dr. Martin writes: "With only minor exceptions, they all had suitable buildings and interiors; . . . without exception, I believe all of them have a system of case records, and the average of completeness in this respect was above that found in the United States." Laboratories, X ray outfits, provision for graduate internes, dispensary departments, modern laundries and kitchens, were in evidence in nearly all the larger institutions, and those hospitals which had not full equipment seemed frequently to be in line for rapid adjustment. Two defects especially noted were the lack of screening against flies, mosquitoes, and other insects, although in Montevideo one operating-theatre had an antechamber with blue-glass windows, it being contended that flies would not pass through blue-lighted space. The nursing, however, requires organisation. The condition of "caste" prevents members of the aristocracy from entering the nursing profession, and the middle-class is small, but the general standard of education is being raised, and new training schools are being established with American nurses in charge.

The medical schools visited were those connected with the universities of Lima, Santiago, Buenos Aires, Montevideo, São Paulo, and Rio de Janeiro. A primary, high-school, and university education is required for admission to the medical schools. Peru, Chile, Brazil, and Argentina demand a seven-year course of medicine, Uruguay a six-year course. Judging from a cursory visit, Dr. Martin considers the physical properties of each of these schools—i.e., site, aspect, planning, and architecture—modern and adequate, whilst clinical and dissecting material seemed abundant. The medical faculties appeared strong in the constitution of the universities, and the students compared favourably with those of the United States, Canada, and England as regards demeanour. A knowledge of foreign languages, and experience gained in foreign travel, were commonly found among them, and many of the highest social class were entering the ranks of the medical profession. A unique system of control was found in the university system of Argentina, one-third of the votes being in the hands of the full professors, and one-third in those of the junior professors and instructors, the remainder being controlled by the students. When the writers visited La Plata University, Buenos Aires, it was to discover a strike of the last-named in full swing. At Rio de Janeiro they were present at the opening of the year of the Faculty of Medicine, and at São Paulo witnessed the final session of a concourse on the occasion of the election of a professor of gynæcology. At Santiago the city ambulance service was tested by a casual telephone call: the snake farm at Butantan, in Brazil, was visited, where sera for use against snake-poison are manufactured. The Oswaldo Cruz Institute at Rio, named after its founder, who eradicated yellow fever and plague from the city and neighbourhood, roused in Dr. Martin the desire to see another such splendidly arranged and equipped centre for research in tropical diseases under American control in the Canal Zone at Panama.

Dr. Watkins, in an interesting note on the racial conditions of the countries visited, observes that colour prejudice is apparently non-existent. Negroes are numerous in Peru and Brazil, less so in other parts of the continent: many of them are well-educated, industrious, and prosperous. Tuberculosis, and interrelation with the whites, are, it would seem, solving the negro problem. The Indian race is much in evidence in Peru and Brazil, but only to a limited extent in Chile, Argentina, and Uruguay.

This is a small book packed with interesting information, much of which will come as a surprise to the English reader, who, for the most part knows little of the social or professional conditions in the countries visited by Dr. Martin and his colleagues. We recommend it cordially to the attention of our readers.

COLOUR-VISION.

Methoden zur Untersuchung des Licht- und Farbensinnes sowie des Pupillen-spieles. Included in Abderhalden's Handbook of Methods of Biological Research. By CARL V. HESS (Munich). Berlin and Vienna: Urban and Schwarzenberg. With 82 figures. Pp. 364. M.78.

THIS book deals with some of the more abstruse parts of physiological optics, and especially the methods of measuring the light and colour senses. Dark adaptation at the fovea is one of the problems attacked, and the writer gives reasons for disagreeing with those who hold that Purkinje's phenomenon does not apply when light is focused exclusively on the macula. This goes to discredit the theory of a double retina consisting of two visual apparatus, one for ordinary light and the other for dim light—a theory which was propounded some 40 years ago by Parinaud and supported by von Kries. The truth

has not as yet been established, but Hess has always been an opponent of Parinaud's theory. A good deal of space is devoted to the phenomena of simultaneous and successive contrast, and an original method of testing colour-blindness is described. We miss any reference to English authorities on this subject (with the exception of Lord Rayleigh), notably to Dr. F. W. Edridge-Green, whose Arris and Gale lecture we publish this week. In cases of optic nerve atrophy or central scotoma confined to one eye, the colour vision of the affected eye is similar in nature to that of a more or less excentric part of the sound eye. This fact would seem to support Parinaud's theory, but the subject is very involved. In the hope that comparative physiology will throw some light on it the attempt has been made to study the light and colour senses in animals. For instance, if chickens are placed in a dark receptacle, and the light is gradually increased until they begin to peck at grains of corn, it is found that this point is reached sooner if the chickens have previously been kept in a dark chamber, thus proving that they possess adaptation. A comparatively short chapter is devoted to pupil reaction, in which a new apparatus is described for testing the hemianopic pupil reaction. Since this is theoretically possible without the existence of hemianopia, the author proposes to describe the condition by a new term, "hemikinesis."

To those at least who do not easily read German, the book will be found somewhat prolix, but it cannot be ignored by workers in the subjects with which it deals.

A MANUAL OF PRACTICAL ANATOMY.

By THOMAS WALMSLEY, Professor of Anatomy, Queen's University, Belfast. Part II.: The Thorax and Abdomen. London: Longmans, Green and Co. Pp. 233. 10*s.* 6*d.*

THE second volume of this manual more than confirms the good opinion we formed on Part I., which dealt with the extremities. The descriptions seem a little fuller, and the figures, while retaining their clearness, show rather more finish. We would have preferred to see Addison's lines definitely recognised as such, and used on the principle employed by their author, not mixed with other and probably less dependable markings obtained in other ways. A slight correction is required in the relation to the left auricle assigned to the oblique vein of Marshall. This volume, as a whole, is excellent, and can be recommended as a reliable guide to any student dissecting the trunk.

DISEASES OF THE INTESTINAL CANAL.

Traité de Pathologie Médicale et de Thérapeutique Appliquée. Vol. XI. Appareil Digestif. By JEAN-CHARLES ROUX, J. CHOMPRET, GASTON DURAND, BRISSARD, MONTIER, BENSAUDE, TRÉMOLIÈRES, and CAUSSADE. Paris: A. Maloine et Fils. 1921. Pp. 776. Fr.35.

To those who are acquainted with the admirable works on diseases of the alimentary canal by the late Albert Mathieu and Jean-Charles Roux, the present volume, to which Dr. Jean-Charles Roux contributes the opening section, must be a grave disappointment. It is true that the section written by Dr. Roux is fully on a level with his usual medical work. His exposition of the doctrine of Vagotonia is both logical and critical, and his comments on sympathetic hyperæsthesia are most suggestive. Dr. Roux's descriptions of these conditions which, beginning with a trifling gastric pain and diminished appetite, go on to visceroptosis, inanition, permanent fatigue, colitis, and grave general disease, form clinical pictures worthy of Bright himself. "L'esprit gaullois," wrote the late George Meredith, "shines with the clear crystal of commonsense," and it is those qualities of critical judgment, verbal felicity, and vast clinical experience which have led us to prize everything that Dr. Roux has written. Perhaps it is the exceptional nature of this opening section which leads to dissatisfaction with succeeding chapters; that dealing with diseases of the tongue is well written and described, but the section devoted to oral sepsis seems inadequate and the articles discussing the diseases of the stomach are on an altogether inferior plane. The remarks of Dr. Gaston Durand on hyperchlorhydria and hypersecretion leave the suspicion that no clear pathological conception is present in his mind; at any rate, he conveys none to his readers; and the same vague treatment is noticeable in certain later sections of the book.

In a pathological treatise which occupies 32 volumes the student has some right to demand completeness; it is therefore disappointing to find no reference—save a promise, apparently unfulfilled, that it will be dealt with in a later chapter—to so important a subject as diverticulitis. Faulty editing may be responsible for this and for the fact that the excellent chapter on hæmorrhoids, by Dr. Bensaude, is not followed by a reference to the various diseases of the anus. It is significant that the chapter on duodenal ulcer forms no part of the original volume, but is inserted in the form of eight unnumbered pages in the middle of the book.

MIDWIFERY AND GYNÆCOLOGY.

The Practitioner's Encyclopædia of Midwifery and the Diseases of Women. Edited by JOHN S. FAIRBAIRN, B.Ch. Oxon., F.R.C.P. Lond., F.R.C.S. Eng., Obstetric Physician, St. Thomas's Hospital, &c. Oxford Medical Publications. London: Henry Frowde and Hodder and Stoughton. 1921. Pp. 950. £3 3*s.*

THE object of this book is to help in closing the gap which the editor believes to exist between the art of midwifery and that of the treatment of diseases peculiar to women, and more especially to enable the practitioner to strive for modern ideals of prenatal hygiene, to assist in the improvement of the midwifery service, and to work for the prevention and cure of the disabilities consequent on pregnancy.

The work is well conceived, and is likely to succeed in furthering the advance of general practice on modern lines. Dr. Fairbairn has obtained the coöperation of a band of writers whose names command respect. The anatomy, development, and physiology of the female reproductive organs is considered in Part 1, while Part 2 deals with pregnancy, labour, and the puerperium. We would call special attention to the excellent account of the hygiene and management of pregnancy contributed by J. W. Ballantyne, and to that on the application of hospital methods to private midwifery practice by J. Haig Ferguson; while the description of the relief of pain in labour by R. C. Buist contains a full description of the various methods of anæsthesia available and their several indications. Part 3 deals with abnormal reproduction including abnormal pregnancy, labour, and the puerperium. Here Gordon Ley gives an account of the toxæmias of pregnancy and R. Jardine deals with the treatment of eclampsia. A. W. Russell writes fully on twins, and Munro Kerr's learned article on delayed and obstructed labour embodies in brief the results of his large experience. The editor contributes a useful summary of abnormal pregnancy and labour. In Part 4 articles on the physiological principles underlying management, artificial feeding of infants, management of premature babies, and complications during the first month of life are contributed by Eric Pritchard; H. C. Cameron deals with the medical supervision of the infant, and J. Herbert Fisher adds a complete and lucid account of ophthalmia neonatorum.

The most interesting and novel sections of the work deal with conditions simulating or complicating diseases of the reproductive tract. Victor Bonney discusses the acute abdomen; ventral herniæ and allied conditions are dealt with by Henry Jellett; affections of the urinary tract by S. G. MacDonald; useful and important articles on neurasthenia and the temperamental factor are contributed by T. Grainger Stewart and the editor; and mental disease and psychical

disturbances are dealt with by W. H. B. Stoddart. Part 6 contains information not readily available in the ordinary text-books dealing with midwifery and gynæcology. The rôle of obstetrics in preventive medicine is made clear by Eardley Holland, maternity and infant welfare centres are discussed by S. W. Wheaton, and industrial occupations and the health of women by Rhoda H. B. Adamson; Catherine Chisholm writes on menstruation, Edwin Smith on medico-legal problems. Part 7 deals with various operations and therapeutic procedures and contains, among other useful articles, one on twilight-sleep by W. Osborne Greenwood; Robert Knox writes on the uses of X rays, E. P. Cumberbatch on electricity, A. E. Hayward Pinch on radium, and J. B. Mennell on massage and physical exercises in the light of their application in the treatment of the diseases peculiar to women.

It will be seen from these examples of its contents that the scope of this book is wide. The lines on which it is drawn up are sound as well as original. It will prove most helpful to the practitioner since it represents all that is best in the current teaching of midwifery and gynæcology in this country at the present time. The index is full and the printing and format good.

Thérapeutique Gynécologique. Second edition. Par P. GUÉNIOT, Professeur Agrégé à la Faculté de Médecine de Paris. Paris: J. B. Baillière et Fils. 1922. Pp. 400. Fr.25.

THE second edition of this useful work has been extensively revised. Among the modified sections are those dealing with the action of X rays in the treatment of cancer and of fibroid tumours of the uterus; the repair of vesico-vaginal fistulæ through the bladder; the various operative methods of dealing with prolapse of the uterus; the operative treatment of fibro-myomata and of cancer of the cervix and body of the uterus. A new chapter has been written on the performance of gynæcological operations during pregnancy. The book has thus been rewritten to a large extent and its value considerably increased. It forms a safe guide to French teaching in that special branch of medicine of which it treats, and its clear arrangement will recommend it to those who require a reference-book of treatment. The figures are well drawn and reproduced and the index is adequate.

Synopsis of Midwifery. Second edition. By ALEC W. BOURNE, B.A., M.B., B.Ch. Cantab., F.R.C.S. Eng., Obstetric Surgeon to In-patients, Queen Charlotte's Hospital. Bristol: John Wright and Sons, Ltd. 1921. Pp. 211. 15*s.*

THIS book is intended as an aid to the student in revising his work and in preparing for examinations, and for this purpose it should prove very useful. This edition shows signs of thorough revision and new matter has been added, particularly on the toxæmias of pregnancy and the hæmorrhages of pregnancy and labour. The book is a trustworthy epitome of the subject and forms a reliable guide to the student.

PRACTICAL MEDICINE SERIES.

Vol. II.: General Surgery. Series 1921. Edited by ALBERT OCHSNER, M.D. Pp. 625.. Vol. III: The Ear. Edited by CASEY A. WOOD, C.M., M.D. The Nose and Throat. Edited by GEORGE E. SHAMBAUGH, M.D. Pp. 392. Chicago: The Year Book Publishers. $2.50 each volume.

THE Practical Medicine Series consists of eight volumes, which deal with the various branches of medical science. The whole work is republished every year, so that each volume forms a review of the advances made in the year preceding publication, which should be valuable to practitioners.

The volume on general surgery is in many ways admirable. The whole range of surgery is dealt with, and the amount of information conveyed is remarkable. We have found something of interest in every chapter, and those on the stomach and duodenum and on the thyroid gland call for special mention. But though the underlying principles and the matter of this volume are alike so sound, their presentation is poor; the articles are written in a colloquial and inelegant style. The full-page plates are a continual source of annoyance, for they mostly face pages of the text with which they have no concern. The volume is too good to be spoilt by such defects.

In Vol. III. the papers abridged are numerous, and are derived mostly from American sources. The book reflects credit on the editors, whose labour must have been enormous. But while it is a useful work of reference, accompanied by a good index of subjects and authors, it would have been improved by the omission of a considerable amount of material. Many papers of interest and some good original work are swamped by articles of little value; some of these are, it is true, followed by a short trenchant criticism from the editorial pen, but it would surely have been simpler to have ignored them altogether.

BOTANY.

For Students of Medicine and Pharmacy. By F. E. FRITCH, D.Sc., Ph.D., F.L.S.; and E. J. SALISBURY, D.Sc., F.L.S. London: G. Bell and Sons, Ltd. 1921. Pp. 357. 10*s.* 6*d.*

THIS elementary course of botany has been largely based upon two earlier books by the same authors, parts of which have been reproduced in an almost unaltered form and incorporated with fresh matter to form a very useful volume. An introduction by Prof. A. E. Boycott points out the value of the study of botany for medical students and warns the reader against a too utilitarian attitude. The value of a general acquaintance with botany is insisted upon as helping the practitioner to understand his patients and because "no one can tell what particular item of knowledge is going to be useful—indeed, necessary—at any point in his pilgrimage." The needs of the medical student are well provided for and the more difficult parts of the subject are dealt with in a way that is at once interesting and easy to understand. The majority of the figures are original and are so well drawn as to form good models for the student's own drawings of his practical work. The type system is not adopted in this book, each group of plants being treated in a general way with frequent examples; necessary information about the various prescribed types is included and can be easily found when required. The physiological aspect of the subject is well set out, being approached from the experimental side and illustrated by figures which will help the student to carry out experiments for himself.

From the point of view of the student of pharmacy, the book is not quite so satisfactory. Such students need a rather fuller treatment of the various types of stem, leaf, root, and fruit structure than is to be found here. They also need a more detailed account of the numerous medicinal plants belonging to the families included in the book.

JOURNALS.

JOURNAL OF PATHOLOGY AND BACTERIOLOGY. Vol. XXV., No. 1. Pp. 1–152.—The January issue contains the following articles: On *Bacillus welchii* Hæmotoxin and its Neutralisation with Antitoxin, by H. G. M. Henry. Filtrates of cultures by *B. welchii* made under suitable conditions contain an active hæmolysin, dissolving mouse, pigeon, and fowl corpuscles very readily, those of the horse with some difficulty; the cells of man, rabbit, guinea-pig, and sheep occupy an intermediate position. This hæmotoxin keeps well in the cold or in dried ammonium sulphate or alcohol precipitates; at higher temperatures it loses a large proportion of its activity rather quickly, though a certain amount will withstand short boiling. It is neutralised with antitoxic serum, following the law of multiple proportions.—The Action of Dilute Acids upon Bacterial Growth, by I. Walker Hall and A. D. Fraser. Starting with a medium of uniform reaction, the authors have

measured the influence of a number of different acids on the rate of growth of a variety of organisms. Generally speaking, lactic and nitric acids stimulate growth while salicylic, butyric, and phosphoric acids delay it. A connexion is suggested with bacterial infection in fatigue, anæmia, uræmia, and other conditions in which lactic acid is present in excess in the body.—Fatty Changes in the Liver, Heart, and Kidney, by C. G. Imrie. Evidence has been previously obtained that when fat is increased in the liver, heart, and kidney the additional amount above that which is normal to the particular organ is of the same composition as the fat of adipose tissue. Further experiments along these lines are now reported, on dogs dosed with pulegone, which are consonant with this interpretation of fatty change, but the figures are not very conclusive.—A Tuberculosis-like Disease in the Halibut Associated with the Presence of an Acid-fast Tubercle-like Bacillus, by P. L. Sutherland.—The Wassermann Reaction with Unheated Human Sera, by C. H. Browning, E. M. Dunlop, and E. L. Kennaway. Almost all unheated normal sera will give a positive reaction if the concentration of alcohol in the mixture is increased about three times; a few react with the customary concentration; the use of unheated human serum is inadmissible.—Malignant Sacrococcygeal Chordoma, by M. J. Stewart.—The Classification of Some Lactose-fermenting Organisms Isolated from Cheeses, Waters, and Milk, by T. Redman. An attempt to discover whether the coliform organisms obtained from cheese and associated liquids are of fæcal origin by classifying them on MacConkey's system and by agglutination. The results are complex and indeterminate.—On Heterophile Anaphylaxis, by T. Taniguchi. The sera of rabbits, prepared by injections of sheep corpuscles, are toxic to guinea-pigs and cause death with the signs and symptoms of anaphylactic shock, but they are not toxic to rabbits. The sera of guinea-pigs prepared in the same way are toxic neither to guinea-pigs nor rabbits. Guinea-pig tissues injected into rabbits induce the generation of sheep corpuscle hæmolysins. The anaphylactic phenomenon is due to the interaction of the heterophile antigen in the guinea-pig and the heterophile antibody in the serum which is injected. Normal human serum sometimes contains a certain amount of heterophile antibody and may cause symptoms on injection into guinea-pigs and other animals (dog, cat, mouse, tortoise, &c.) which have heterophile antigen. Heterophile antigens are associated with the lecithin fraction of tissue lipoids.—Blood-platelet Antiserum, its Specificity and Rôle in the Production of Experimental Purpura, by S. P. Bedson. Some doubt was left by the author's previous work on this subject as to whether the purpuric hæmorrhages produced might not be due to agglutination of red corpuscles. He now clears this up and shows that antiplatelet serum alone produces purpura and not sera prepared by immunisation with any other blood elements. The main factors in the causation of the hæmorrhages are the toxic action on the endothelium and the absence of platelets from the circulation.—The Cultivation of the Gonococcus, by C. E. Jenkins. Using watery agar, 0·5 to 1 per cent. of citrated plasma gives as good results as 10 or 20 per cent. whole blood; the most important point is to have moist agar.—The Production of Peroxides by Pneumococci and Other Bacteria, by J. W. McLeod and J. Gordon. Filtrates from cultures of pneumococci grown with free access of oxygen inhibit the growth of many other bacteria. This is due to the formation of hydrogen peroxide, which is naturally destroyed by heat. As the pneumococcus does not produce catalose, peroxide accumulates in the cultures and may kill off the growth.—Metastases in Bone Marrow, by A. Piney. No lymphatics can be found in bone marrow. Metastatic growths of carcinoma (but not lymphadenoma) spread in and often occupy the blood vascular spaces, reaching the marrow by the arteries. In their neighbourhood a myeloid reaction is aroused which accounts for the blood picture often found in these cases.—Staining Reactions of Fat in Tissue Sections, by J. Lorrain Smith and T. Rettie. Fats may be mordanted for hæmatoxylin staining by aldehydes if some free fatty acid is present, more easily if cholesterin or lecithin is also in the mixture. Glycerine is also effective probably owing to the formation in it of formaldehyde. The hydrolysis of fat in sections exposed to light and air is mostly due to the light and not to the ultraviolet rays.—The Relation Between Antiseptic Action and Chemical Constitution in the Synthetic Aniline Dyestuffs, by T. H. Fairbrother and A. Renshaw. An extensive investigation which it is not possible to summarise. Generally speaking, no common rule has been found connecting antiseptic action with chemical and physical properties such as those relating tinctorial power to molecular weight and chemical constitution. Individual dyes have specially great or small antiseptic action on account of their individual molecular structure. A series of dyes was found which will kill protozoa (paramœcium) and not bacteria.—On an Organism Obtained from Carcinomatous Growths with a Description of its Pathogenic Effects on Mice, by J. Young. The pleomorphic organism previously cultivated from human cancers has been found also in mouse carcinoma. Subcultures inoculated into mice produced the lymphomatous leukæmia which occurs in those animals in about 70 per cent.

ANNALS OF MEDICAL HISTORY. Vol. III., No. 3, September, 1921. New York: Paul B. Hoeber. 1921. $2.50.—This number leads off with an amusing paper by Dr. H. A. Colwell upon that eccentric practitioner Gideon Harvey, whom Dr. Colwell calls, with justice, "a medical bounder." He was, however, an entertaining person, and not without abilities. Of other papers, Dr. H. M. Browne relates a witchcraft story translated from Hieronymus de Rubei, and Dr. J. S. Taylor continues his study of Montaigne and Medicine. The most interesting article for British readers is that by Dr. M. Charlton, dealing with the life of William Rawlings Beaumont, F.R.C.S. Eng., 1803–1875. He was a student of St. Bartholomew's Hospital and a favourite pupil of Abernethy, and also studied in Brussels and Paris, where he attracted the favourable attention of Amussat. He settled in Toronto in 1841 and in 1843 was appointed professor of surgery in the newly-founded King's University, now the University of Toronto, which post he held for ten years. He soon became the leading surgeon of Canada and continued to practise until 1873, when his sight, which had been failing for some time, was completely lost. He was a skilled inventor and among other instruments devised one which not only had a great influence upon surgery, but affected the whole domestic and commercial world. It was an instrument, invented in 1837, for passing deep sutures in the tissues as in operations for cleft-palate, but being seen by Mr. Singer in the shop of a surgical instrument-maker named Freeman, in New York, he was so struck by the ingenuity of the mechanism that he adopted it for his sewing-machine. The needle was also found of great use in the treatment of vesico- and recto-vaginal fistulæ. A specimen of the instrument is in the Museum of the Royal College of Surgeons Catalogue D. 34, Parts III. to IV., as are other instruments invented by Beaumont—namely, the polypus snare, 199, Gynæcological Series; a vaginal speculum, 27 C. in the same series, and probably a rack-and-pinion snare for nasal polypi numbered C. 14 in the surgical instrument collection. The following excerpt from the Catalogue of the Hunterian Museum of the Royal College of Surgeons of England deals with Beaumont's inventions:—

D. 31. Parts III. to VII.

Beaumont's Sewing-Machine Suture-Carrier for Operation of Cleft-Palate.

(The Origin of the Sewing Machine.)

Total length 6¼ in. (15·8 cm.), length of handle 2¾ in. (7 cm.). No maker's name.

In a hollow, square white-metal tube runs a needle (worked on a flat down-curve ebony handle) with an elevation about 1¼ in. (3·17 cm.) from its free end. In this free end is a slot for carrying the suture. On the outside of the tube is fitted a bar

that works on two slides, and carries a blue-tempered steel spring. This spring is bent at right angles, and carries two more slot eyes which operate one on each side of the slot on the needle. The elevation on the needle works on a shoulder on the outside spring, giving the particular movement that causes the sewing-machine action. The hollow tube is pushed between the two slots to fix the portion to be sutured. A long ebony chequered handle is fitted at right angles to the main shaft, and a thumb-clip is fixed to the tube portion for pushing it home. The main shaft is bent across the free end of the needle for protection.

From THE LANCET, 1866, Vol. I., p. 302.—*The Sewing Machine.* It may not be generally known, but the fact deserves to be recorded in THE LANCET, that the principle of passing and arresting the thread in Singer's sewing machine was taken from an instrument invented by a distinguished member of our profession, Mr. W. Rawlings Beaumont, of Toronto, an Honorary Fellow of the Royal College of Surgeons of England, who used the ingenious instrument for passing sutures in vesico- and recto-vaginal fistula. Singer took his idea from Mr. Beaumont's instrument exhibited in the shop of Freeman, a surgical instrument-maker in New York.

William Rawlings Beaumont (1803–1875) invented the polypus snare 199, Gynæcological Series, when in practice in London in 1838; in 1841 he emigrated to Toronto, and is chiefly remembered for his researches in a case of gastric fistula. He designed the vaginal speculum, 27 C., Gynæcological Series, and probably, the rack-and-pinion snare for nasal polypi, C. 14, in this collection.

Reports and Analytical Records

GLUCARSENOL-"C."

(MODERN PHARMACALS, 48, MORTIMER-STREET, W. 1.)

WE have received a sample of glucarsenol-"C," a solution of novarsenobenzol—"914," which can be used for intramuscular injection. The solution is stable, preserved in vacuo, and represents a successful piece of therapeutic work in that by its use, properly administered, the greater defects of the employment of novarsenobenzol are avoided. Glucarsenol-"C" is prepared in the following doses of "914"—namely, 0·05, 0·10, 0·15, 0·20, 0·25, and 0·30 g.

Each dose being dissolved in 1 or 2 gr. of vehicle	Urocaine	1 gr.
	Neocaine	1 gr.
	Saturated aqueous solution of pure crystallised glucose ..	98 gr.

On special request larger doses—0·35, 0·40, and 0·45 g.—are prepared. The novarsenobenzol in the preparation is tested carefully for toxicity by biological experiments. The advantages claimed for glucarsenol-"C" are that it mixes perfectly with the serum so that smooth injections are easily made with a fluid which is painless, while it is completely absorbed and unaffected by temperature or climate.

VALENTINE'S MEAT-JUICE.

(VALENTINE'S MEAT-JUICE COMPANY, RICHMOND, VIRGINIA, U.S.A. AGENTS: F. NEWBERY AND SONS, LTD., 27 AND 28, CHARTERHOUSE-SQUARE, LONDON, E.C. 1.)

Valentine's meat-juice enjoys a very high reputation as a stimulant, and it is interesting to note that as compared with analyses published in 1908 by the Connecticut Experimental Station, the product has been materially improved. Our own analysis gives the following composition:—

Water	54·8 per cent.
Total solids	45·2 ,,
Consisting of—	
Mineral matter	11·1 ,,
Meat bases, including creatin and creatinin	24·07 ,,
Albumoses and peptones	2·63 ,,
Fibre and coagulable proteins ..	trace

These figures are consistent with those of juice prepared from meat. The percentage of meat bases has been increased and now constitutes over 90 per cent. of the total proteins. Meat juices differ in their mode of preparation from meat extracts and are supposed to be prepared by extracting the fluid substance contained in the muscle fibres. Meat extracts, on the other hand, are made by heating fresh meat under pressure with a little water. Apart from the nutritive value of the actual proteins contained in it, a well-prepared meat juice may serve usefully as a digestive stimulant, assisting the assimilation of other foods by exciting a flow of gastric juice.

MANNA BREAD.

We have received from Mr. Robert Graham, of Belfast Chambers, 168, Regent-street, London, W. 1, samples of what is described as a complete food in bread form designed to meet the needs of poor children who have to live largely on bread. The comparative analysis of this manna bread and ordinary wheaten bread is given by Mr. Graham as follows:—

	Manna bread.	White bread.	Manna Wholewheat bread.	Wholewheat bread.
Moisture	44·75 ..	40·00	46·50 ..	45·00
Protein	13·56 ..	6·50	12·12 ..	6·30
Starch, cellulose, &c...	34·17 ..	51·50	33·78 ..	46·00
Fat	3·70 ..	1·00	3·15 ..	1·20
Mineral Matter ..	2·27 ..	1·00	2·60 ..	1·50
Crude fibre	1·55 ..	—	1·85 ..	—

Manna bread is stated to be made from soya bean which has long been prized as a foodstuff in the Far East and differs from other beans and legumes in its high protein (33–40 per cent.) and fat (18–20 per cent.) content, carbohydrate (some of which is cane sugar) being correspondingly low. The bean has been used to prepare a milk-similar already described in our columns[1] and in various industries.[2] Its food value was tested by Osborne and Mendel in 1917, who found that in the cooked meal as much as 82 per cent. of the protein might be utilised; the ash is defective in calcium and chlorides. The samples of bread supplied were of uniform texture and consistence, neither too moist nor too dry, and very palatable, especially to children.

Prof. E. Löwenstein has made clinical tests with the bread prepared by Mr. Graham on 54 persons in Vienna, and states in a letter to him that no ill-effects whatever were observed. All those who consumed it were ready to renounce their official bread ration for an equal quantity of the soya bread.

NORMANDIN'S INVALID COGNAC.

(E. NORMANDIN AND CO., CHATEAUNEUF, COGNAC, FRANCE. AGENTS: LOUIS MAIGNEN AND CO., 3, CROSS-LANE, LONDON, E.C. 3.)

Claim is made for this brandy that it is natural—i.e., made by the distillation of grape wine—that it is unsweetened and 20 years old. The analytical data which follow support these statements.

Density at 15·5° C.	0·9527
Proof spirit	70·32 per cent.
Alcohol by volume	40·19 ,,
Organic extractives	0·28 ,,

Secondary constituents.	Parts per 100,000 of absolute alcohol.
Fixed acidity	nil
Volatile acidity (as acetic)	27
Furfural	2
Aldehydes	20
Esters (as ethyl acetate)	63·4

The value of a fine brandy is determined to a great extent by the character of the secondary constituents which are present, and, in this case, the secondary constituents closely resemble those found in old cognacs of known origin. The sample supplied is agreeable to the palate and the cognac may be safely recommended for medicinal and other purposes.

AMBRIODIN (CENTAUR).

(THE CENTAUR CHEMICAL CO., LTD., BASSISHAW HOUSE, BASINGHALL-STREET, LONDON, E.C. 2.)

The composition of this convenient form of administering combined bromide and iodide in the treatment of epilepsy was given in THE LANCET of May 15th, 1920, p. 1074. The method of packing has now been improved and we are informed that tonic properties have been added. Ambriodin is not advertised to the public.

[1] THE LANCET, 1915, ii., 1263.
[2] Ibid., 1916, i., 169.

THE LANCET.

LONDON: SATURDAY, FEBRUARY 25, 1922.

Grants-in-Aid of Health.

THE remarks[1] of the Committee on National Expenditure regarding the principle of grants-in-aid of local outlay on health recalls to mind a "certain blindness" to which WILLIAM JAMES refers when he is discussing the inability of each one of us to appreciate the point of view of his fellow creatures. The Geddes Committee, so far as can be judged from its treatment of the principle of grants-in-aid, is affected with blindness of this character with regard to certain social services. The Committee describes such grants as a "money-spending device," being apparently unmindful of the fact that there is another side to the account and that grants-in-aid may have been adopted primarily from the point of view of prevention of disease. How would this work, one wonders, in relation to railway or industrial enterprises? Any big railway concern sees to it that the permanent way and rolling stock are kept in such a state that the receipts are not swallowed up in compensation for accidents or damage to goods conveyed. Expenditure on public health services is similarly preventive of large useless expenses under other headings. The Economy Committee, it may not unfairly be presumed, lacks first-hand knowledge of the way in which people live in their homes, or are educated in schools, or are treated for ailments. The principle of grants-in-aid has been in existence for many years and the grants have acquired the status of a well-established custom. Originally they formed an important part of the delicate mechanism whereby a central Board might influence the working of bodies more under the sway of local interests; at this time the amounts were inconsiderable, being in fact no more than contributions towards the salary of the medical officer of health and of one or more of his staff. The advent of medical inspection, and, more particularly, of medical treatment of elementary school children, swelled the amounts paid to local authorities by the Treasury. That the money spent by local authorities on school medical work was economically administered is hardly in dispute, and without monetary aid from the central Government the treatment schemes now in being would certainly not have reached their present degree of efficiency. The whole of the school population comes under the view of specially appointed medical men whose concern it is to diminish morbidity; vast numbers of school children now receive medical treatment who before were unaided. While it cannot be said that this medical treatment has always been welcomed by parents; tacked on as it has been to the national educational system, the public generally has been inclined to accept it as something unavoidable, like school attendance.

Later when the principle of grants-in-aid came to be applied to maternity and child welfare work the country was in a disturbed economic condition. Public attention tended to ignore the valuable work of the many maternity and child welfare centres which had sprung into existence, and focussed itself rather upon the use to which a relatively small number of local authorities were putting their powers of granting milk. The feeding of school children had caused similar contention, but as the result of judicious control, especially by the local authorities, the problem was rarely allowed to stray beyond manageable limits. Coming at a time of extreme political difficulty, the new power to grant a valuable food in the form of dried milk to a large proportion of the population of crowded areas carried with it an adventitious advantage which was not neglected. That the assistance afforded might have been kept within more reasonable bounds at any time is suggested by the diminution of such expenditure achieved by a majority of local authorities who made efforts in this direction. Maternity homes instituted by local authorities have also proved expensive to run in not a few instances, but in view of results there should be no difficulty in justifying the expenditure involved. In the most recent grant-in-aid for public health the proportion paid out of the taxes reached 75 per cent., but it would be hard to refute the contention that the small amount to be borne by local authorities had much to do with their ready acceptance of the task of providing facilities for the early treatment of venereal disease, an investment on which the return is usurious. A grant-in-aid to a V.D. clinic is only a money-spending device to those who act on a penny-wise policy.

In regard especially to the welfare of motherhood and infancy there is no doubt that the Ministry of Health at the time of its formation desired not only to carry on but to improve the good work initiated by its predecessor. The system of the fifty-fifty grant-in-aid has been a valuable stimulus to progressive bodies, and has afforded material evidence of Ministerial appreciation, which in itself is of high moral value to sanitary authorities. Unfortunately, the many difficulties which beset the Ministry at the outset led to some confusion in respect to the object of grants. The Local Government Board failed wholly in one essential which it was hoped the Ministry would solve—namely, the differentiation between the prevention of disease and the relief of destitution. In 1918 the Board sought to extend the operations of sanitary authorities to the relief of destitution by providing milk for the necessitous, solely on the grounds of necessity. The Poor-law authorities were already equipped with power and finances to meet this end. Sanitary authorities, thus empowered, and urged by the L.G.B. Order to relieve the necessitous at once, undertook the burden which it was the proper function of the destitution authorities to bear. The consequences of this error were soon apparent. Rates on account of welfare work were unduly swollen, grants-in-aid correspondingly increased, with the result that the Ministry could devise no better means to remedy the error than a threat to reduce to 5 per cent. their grants in aid of amounts expended by sanitary authorities for the welfare of mothers and ailing infants on health grounds. We believe that the differentiation is now becoming better understood, and no objection is now made to the 50 per cent. grant to provide what is necessary for the prevention of illness, and not merely offered as a dole to the destitute. As at present administered the aid comes to any ailing necessitous mother or infant, but not in lieu of the provision of sustenance arising solely from destitution. Presently it may be hoped that the Ministry of Health will be able to arrange that the relief of destitution shall rest with the destitution authorities, and so put an end to

[1] Economy in Health Administration, THE LANCET, Feb. 18th, p. 337.

the overlapping between sanitary and destitution machinery. For extravagant authorities (if such there be), loose in their outlay on actual public health services, the central authority might fix a maximum sum on which to contribute its proportion. Whether further money should be spent over and above this out of the rates, or the advantages foregone, is then a matter for free choice on the part of the local inhabitants. Finally, the Economy Committee might well have expressed a hope that the Ministry of Health should at an early date become such in fact as well as in name, by becoming the central organisation for the many health activities still scattered through numerous Government departments. Therein lies a real and lasting economy.

Constellations in Medicine.

AN article by Dr. H. A. BOSMA, of Groningen, which appears in our present issue, introduces to us the word "constellation" as used by Prof. N. P. TENDELOO, of Leiden, to indicate all the factors that determine any particular action or effect, and shows that not until we have split up the whole constellation into its factors do we know what is cause and what is effect. This seems a simple and obvious principle, but Dr. BOSMA demonstrates from the history of medicine that its neglect has often led to a muddled and indefinite conception of causation. The word "constellation" is a useful one in this connexion, expressing as it does by astronomical metaphor the idea of a few prominent factors and others less conspicuous, whilst beyond lie possibilities of still undiscovered influences. But such metaphorical use of the word is not new; Sir MAURICE CRAIG, in his recent book on "Nerve Exhaustion,"[1] writes (p. 52): "In other words, an exhausted nervous system gives rise to a constellation of unhappy thoughts and fears, which quickly create a situation which the sufferer feels to be unbearable." A literary search suggested by this sentence reveals that the word was used by JUNG as long ago as 1909, in describing word-association experiments.[2] He found that reactions could be grouped together as dependent upon one set of experiences or emotional tendencies, and to such he gave the name of "constellation," which thus became almost identical with the "sentiment" of orthodox psychology or the "complex" of psycho-analysis, though the last is properly applied only to unconscious sets. Prof. TENDELOO is, therefore, only making a wider use of a word that has already found a similar but more limited application. It is a coincidence that in psychological medicine the relations of cause—or constellation in TENDELOO's meaning—and effect are particularly obscure and just now present an acute problem. The sentence quoted above from Sir MAURICE CRAIG's book carries authority, but there is a fair volume of opinion which would reverse it in many cases and ascribe the exhausted nervous system to the unhappy thoughts and fears. A similar reverse relation may be present in regard to the circulation. Sir MAURICE CRAIG points out the influence of defective circulation upon nervous symptoms, and indeed such an influence is a commonplace of clinical observation, but he quotes on the other hand Dr. LANGDON BROWN's view that profound emotions may, through the sympathetic nervous system, keep blood pressure at a level which is inappropriate for the task of the heart and arteries. The book suggests that "nerve exhaustion," the condition presumed to be present in the neuroses, the psychoneuroses, and many of the psychoses, is dependent upon so many factors that it is not practicable to define a "cause" in any particular case. The recent offer of a reward for the discovery of a cure for "cancer"—altered at once, on proper representations, to a gift in aid of research—illustrated a popular misconception as to diseases, causes, and cures, but Dr. BOSMA's article sets us thinkng whether our own theories may not often contain more simplicity than soundness of reasoning. In discussing causality we might do better to speak of constellations in order to remind ourselves that all science can do in this respect is to determine the conditions under which a phenomenon appears.

[1] Nerve Exhaustion. By Sir Maurice Craig. London: J. and A. Churchill. 1922. Pp. 148. 6s.
[2] Analytical Psychology, by C. G. Jung, p. 94. London: Baillière, Tindall and Cox. 2nd edn. 1917.

Venereal Disease and Continuous Treatment.

WE have received from Lieut.-Colonel Sir JAMES BARRETT and Major W. T. CONDOR a copy of a report furnished by them to the Premier of Victoria on the working of legislation in the State in relation to venereal disease. The whole report is interesting reading, showing, as it does, the common and honourable sequel of enthusiastic legislation—it does not immediately work as intended. The Acts in Victoria were passed, one in 1916 and one in 1918, in deference to an overwhelming mass of public opinion as to the mischief caused by venereal disease; but having been passed it has been found that the State of Victoria does not possess all the necessary provision and material under which to administer those Acts. Sir JAMES BARRETT, with a committee, visited the various day and night clinics provided in Melbourne for both sexes, and they report upon them favourably on the whole, but it was considered that in almost every case there was understaffing, underpayment, or some deficiency of equipment. Thus for various undesirable conditions which came under their notice they make specific recommendations, and, speaking in general, they hold that the machinery of the administration wants considerable alteration. They find that the existing committee appointed to advise the Minister of Health on the whole subject, which is composed of departmental medical officers, together with representatives of the University of Melbourne, the British Medical Association, and the Pharmaceutical Society, is not representative, for it does not contain one practising medical practitioner, male or female; also it is not effective, because it has not been called together during the last 12 months. A good case for reform here is made out.

It is clear from this report and from other communications which we have received from Australia that in the Commonwealth it has been determined to avoid if possible the inconvenience, to say the least of it, which has been caused in this country by the presence of two separate organisations, presumably desirous to benefit the community in the same direction and eternally at variance with each other over the particular way. Sir JAMES BARRETT's report states that "of course a number of people believe that prevention of venereal disease causes immorality," but he does not argue with such folk, stating in so many words that the problem of morality and the problem of disease are separate things. He regrets that money in increasingly large sums should have to be spent in the endeavour to cure, while efforts should be directed primarily towards prevention, and gives whole-hearted support here to the utility of a proper educational campaign. Popular

instruction is assumed in the report to be absolutely essential to the successful working of the two Acts, which, by the way, are recommended for recasting as one enactment; but while the committee ask that a sound educational scheme should be prepared, they recommend, almost insist upon, multiplication of properly equipped treatment centres, and the appointment of a Commissioner for the Venereal Disease Acts, with administrative powers, acting in association with an advisory board of medical men and women.

There is not much in this report that will be novel to us in this country; the Commonwealth is having the same difficulties as we are, and is facing them in the same way with the dissemination of information and the erection of treatment centres. But the suggestion of a Commissioner of Venereal Disease, to whom naturally the incidence of syphilis and gonorrhœa upon the community would have to be revealed, may be pointing to a remedy of the great defect which exists in our combat against venereal diseases—namely, the absence of continuous treatment. At a recent meeting of the National Council for Combating Venereal Diseases such debate as there was turned upon a resolution urging the Government to consider further steps to secure the continuous treatment of infected persons, and all the experience of those present confirmed the knowledge that a large proportion of venereal patients do not undergo treatment to the point when they can be considered safe. Underneath the resolution there was lying an intention to secure, when the country is ready for it, some form of notification, but exactly how notification should be instituted has not been arrived at. The simplest plan which has yet been published is that put forward by the Paddington Propaganda Committee of the National Council through Mr. ARTHUR MORO. Here the suggestion is that persons who attend venereal clinics will be told that they must continue the treatment until they are considered safe to mix again with their fellow-men and women, and that if they do not continue attendance until they obtain discharge by the satisfaction of reasonable tests, their names will be given to the medical officer of health. We have yet to hear what this officer may think about it, but the difficulties would be considerable in spite of the simplicity of the proposal. At a recent meeting of the Public Health Committee of the National Council of Women, a scheme of modified notification was discussed in detail. Dr. MARY GORDON set forth[1] the view in some detail that any form of notification must remain ineffective without police removal and detention at the back of it. There appears, Dr. GORDON concluded, to be little use in notifying a disease like gonorrhœa, for which cure can never be guaranteed, and syphilis where it must take months to determine cure. The suggestion from Victoria to appoint a Special Commissioner for the purpose of receiving all necessary information from doctors or patients is made in view of one particular contingency—that of marriage, and is following the lines of legislation in some of the States of America where, with the hope to secure eugenic union, it is made necessary to file, on both sides, a certificate of freedom from venereal disease. There is no need, however, to confine the benefits of prevention to one class, however important. The great difficulty about any form of notification, when every allowance is made for private feelings and professional reluctance, resides in the fact that it is in many cases a clinical impossibility to certify a cure.

[1] Quarterly News Letter of the Medical Women's Federation, February, 1922.

Annotations.

"Ne quid nimis."

THE BIOLOGICAL ACTION OF LIGHT.

LAST week the Medical Research Council announced the appointment of a representative Committee to advise upon the promotion of research into the biological action of light. The Committee is to consist of the following: Prof. W. M. Bayliss, F.R.S. (chairman); Mr. J. E. Barnard; Dr. H. H. Dale, F.R.S.; Captain S. R. Douglas, late I.M.S.; Sir Henry Gauvain, M.D.; Dr. Leonard Hill, F.R.S.; Dr. J. H. Sequeira; Dr. Edgar Schuster (secretary). The work of this Committee is to be directed towards obtaining better knowledge of the action of sunlight and other forms of light upon the human body in health or disease. The subject is one which has suffered unduly from neglect, considering its intrinsic interest and the important prospect of results. It was the elder Pliny who said "Sol est remediorum maximum," but it has been left to a few pioneers scattered over various countries to put the sun to the test. Such an apparently simple manifestation as tanning of the skin is still open to discussion as to its function and merits. In chronic phthisis it has long been accepted that those who do not tan in sunshine do badly, but many who tan do equally badly, and premature tanning has been regarded as preventing the adequate penetration of light rays and the exertion of their full therapeutic effect in cases of local disease. For surgical affections practice still oscillates between an intensive application of sunlight to the damaged part or more generally to the skin as a whole. The tanned skin has remarkable properties, not forgetting Rollier's observations that it is never attacked by acne or boil and that in a small accidental outbreak of variola among sun-tanned patients the pocks studiously avoided the bronzed areas of the skin. So much for the antipathy of small-pox and ultra-violet rays; but at the opposite end of the visible spectrum it has been claimed—and the claim has never been completely refuted—that the exclusion of all except the red rays of sunlight may prevent the exanthemata of small-pox and measles from being an immediate distress or a future disfigurement. To Charcot is due the first suggestion, in 1859, that particular "chemical" rays give rise to sunburn. Johan Widmark, of Stockholm, in 1889, put the theory to proof, and Niels Finsen promptly worked out its practical application in the closing years of his too brief life.

The Research Committee is not confined by its terms of reference to a limited portion of the electro-magnetic spectrum. Where the visibility to the human eye tails off at either end is a matter rather of accident, and medicine is beginning to appreciate the remarkable range of wave-lengths that act in some way or another upon the body, from the wireless waves of 10 km. or so of amplitude down to the gamma rays with a length of a thousand-millionth of a millimetre. The composition of the Committee leads one to hope that the larger hygienic and sociological aspects of light will also come under review. Demonstration of the vital depression produced by urban winter gloom should help in the propaganda for a brighter London, and appreciation of the reduction of illumination in the best lit room to 5 per cent. or less of the actual daylight outside should lead to unremitting pressure upon architects to widen their window spaces in all buildings, public and private, and to bring them up to the ceiling, let the outside effect be what it may. We await the Committee's reports with pleasurable anticipation.

FARR'S LAW.

AN interesting section of Dr. John Brownlee's recent report, on one aspect of which we commented last week, deals with the so-called Farr's law as to the relation of density of population to death-rate. Is this a law or only an interesting first view of the facts, a

coincidence furthermore which has not been shown to hold good in other countries? The relationship has not remained unchallenged. In a paper read before the Royal Statistical Society in 1891, Sir Arthur Newsholme showed the inapplicability of Farr's formula to dense areas, such as the Peabody Artizans Dwellings, and submitted that a better mode of determining, for public health purposes, the true density of population is a statement of the number of persons living in each occupied room. That with increasing density of population there is a progressively higher death-rate is usually true, and Dr. Brownlee has rehabilitated Farr's work by the use of life-table death-rates. Farr himself used crude —i.e., unstandardised—death-rates and found that they fitted in with his formula. Later it has been found that for standardised rates the law does not hold, but the fit is good when life-table death-rates are employed. The fact that it is not good for standardised death-rates arouses doubt in our minds as to its present applicability. Equally in Dr. Brownlee's mind it is a death-knell for standardised death-rates. We doubt if the use of the word "law" is justified in this connexion. Density and high death-rate usually coincide; but we have travelled far since it was suggested, we believe by Farr himself, that "the formula eliminates the element of density from the analysis of the causes of insalubrity." Hygienists are now concerned in the analysis of a complex cause of insalubrity into its constituent elements, or as near an approach to this as is practicable; and experience of many evil conditions and diseases has repeatedly shown them that by such analyses, involving detailed individual investigations, it becomes practicable to attack and overcome one by one the factors causing urban excess of death-rate. The complex of high urban death-rates has many constituent parts. Questions of poverty, of drunkenness, of syphilis and gonorrhœa are involved. The more frequent opportunities for infection on a massive scale, especially in respect of tuberculosis, enter into the problem; as do also the greater amount of indoor occupations, housing conditions, and so on. Dr. Brownlee warns us that Farr's law is a law of average and can hold good only for large aggregates of population. With this limitation we concur: subject to the condition that its formulation is but the starting-point for inquiry into the many removable causes of excessive mortality in urban life.

FOOT-AND-MOUTH DISEASE.

IN our last week's issue appeared an article by Mr. A. K. Cameron, F.R.C.V.S., on epidemic stomatitis, with particular reference to its pathological significance for human beings. In this connexion various questions will arise in the minds of readers; sufficient is known about the disease to show that its prevention is a problem of special magnitude and complexity. With regard to the epidemiology of this visitation, it is definitely established that the causal agent is a filter-passing virus, but it is not yet known whether the periodical propagation is due to an increase in its virulence, or to re-introduction by means of birds or other carriers, or whether it is maintained, perhaps constantly, in the systems of non-susceptible animals other than cattle, which act as reservoirs. There is apparently no evidence that the disease has any relation to other epidemics alleged to be filter-passing; nor has it ever been established that any relationship exists between it and the filter-passing diseases of man, such as influenza or encephalitis lethargica. Beyond the method of isolation, there are no measures by which, in common with these diseases, epidemic stomatitis can be combated. So long as it is possible to limit the incidence of the disease to certain prescribed areas or places, it is reasonably certain that eradication by means of slaughter is the most satisfactory means available. It is, of course, conceivable that the time may come, if indeed it has not already arrived, when regional limitation by such means will be impracticable. This week, fortunately, the number of newly-infected areas is reported to be abating. Prophylactic immunisation has been extensively tried in other countries but has not yielded the satisfactory results which were expected of it. This is, no doubt, partly due to the low order of immunity conferred by an attack of foot-and-mouth disease, as compared, for example, with that resulting from an attack of rinderpest. As was emphasised at the International Congress on foot-and-mouth disease in Buenos Aires in 1920, no specific remedy for the disease is yet known: in countries where it is prevalent, each recurrent outbreak produces its crop of specifics, which turn out when investigated to be of little value. A year ago reference was made in our columns [1] to experiments, initiated on the recommendation of a departmental committee of the Ministry of Agriculture, and then being carried on at sea in obsolete warships. Presumably this research work is still proceeding, although its nature and extent remain unknown to the veterinary profession.

MEDICAL EVIDENCE AT INQUESTS.

SECTION 22 of the Coroners Act, 1887, provides that, when medical evidence is called at an inquest, the medical witness shall be paid a fee of one guinea for evidence, or, if a post-mortem examination has been made, two guineas. The Public Control Committee of the London County Council is of opinion that these fees are insufficient for the service rendered by expert pathologists in cases of a special nature, involving considerable expenditure of time on pathological, microscopic, or bacteriological examination and attendance at the inquest. The Committee has therefore authorised the payment within the L.C.C. area in special cases of a covering fee of three guineas, with an additional fee of one guinea for each attendance at an adjourned inquest.

THE GROWTH OF THE HUMAN FACE.

A STUDY of the mechanism of the growth of the human face has appeared in the *Dental Record* from the pens of Sir Arthur Keith, F.R.S., and Mr. George G. Campion, L.D.S. The investigation follows two complementary methods: (1) the measurement of living faces at successive age-periods, (2) the analytical comparison of mature and immature skulls to determine the sites at which growth takes place and the quantitative contribution of the different bones to the aggregate result. In the studies of the living face the measurements taken were vertical and antero-posterior—vertical from the nasion to the subnasal point, the incisive margins of the upper incisors and the submental point; antero-posterior from the auditory transmeatal axis to the nasion, the upper incisors and the meatal eminence. These lines of growth are subsequently analysed by the superimposition of life-size drawings of young and adult skulls and also by the superimposition of life-size drawings of the individual young and adult disarticulated bones showing how the aggregate increase in size is contributed by the individual bones entering into the various lines of growth which are studied. Interesting comparisons are also made by the same method between normal adult bones and the corresponding bones of acromegalic faces showing clearly that the enlargement which takes place in acromegalic subjects is due to a true growth process. A demonstration is also given of the method by which the increased breadth of the skull from three years to adult life is attained and that the narrow and high-arched palate associated with the adenoid facies is an expression of defective lateral growth of the whole face. The authors believe that the study opens out a new chapter in our knowledge of the mechanism which transforms the face of the child into that of the adult. They conclude: "We have shown enough to convince everyone that the so-called 'adenoid face,' the narrow, deep palatal arch, the irregular eruption of teeth, are not due to a simple mechanical cause such as the

[1] THE LANCET, 1921, i., 232.

presence of enlarged tonsils, or of adenoid vegetations in the respiratory tidal way. We are dealing with an arrest or a disturbance of the elaborate machinery which underlies facial growth. We have produced evidence showing that this mechanism is influenced by the functional state of the pituitary, and of the sexual organs. We regard enlargement of the tonsils, the growth of adenoid vegetations in the naso-pharynx, and disordered or irregular growth of the jaws and face as manifestations of a single pathological state. What the exact nature of this underlying pathological condition may be we are not yet in a position to decide, but when we keep in mind the close relationship there is between bone-formation and bone-growth, and the action of the glands of internal secretion on the one hand and the frequency with which a hypertrophy of the lymphoid system is accompanied by a defective formation of bone on the other, it is not difficult to believe that irregularities of the jaw and the development of adenoids may result from a nutritional disturbance." The explanation may come through the kind of research now being conducted by Colonel R. McCarrison, who has shown that a diet deficient in certain vitamin constituents will affect the normal working of the hormone growth systems of the body. Vitamins appear to act directly on the glands of internal secretion. Frequent defects in the growth of the English, or Nordic, face may prove to be the result of some deficiency or error in the dietary on which our infants and youths are reared. No doubt, too, our modern dietary is of a kind which leaves teeth, jaw, and muscles of mastication imperfectly exercised. The physical stimuli which are necessary for the normal growth of bone are missing. This, too, may be a factor in gnathic degeneration.

MERCURY INHALATIONS IN SYPHILIS.

IN a paper[1] read before the last annual session of the American Dermatological Association, Dr. H. N. Cole, Dr. A. J. Gericke, and Dr. Torald Sollmann, of Cleveland, give an interesting account of the history, method, and results of the treatment of syphilis by inhalations of mercury. In the old method the patient was placed naked in a closed, heated chamber in which were volatilised mercury compounds such as cinnabar, calomel, red precipitate or turpeth mineral, often mixed with fats, resins, and fragrant oils to give off a dense smoke. The patient was exposed from half an hour to an hour every day or so according to his strength. As the writers point out, although mercurial effects were undoubtedly produced by this method, the indefinite dosage rendered it either inefficient or dangerous. Astruc, in his celebrated treatise on venereal diseases, published in 1754, relates how four of the 37 cases of syphilis—all of a more or less mild type—which were treated by mercury inhalations died during treatment, one as early as the ninth inhalation. About one-third of the patients seemed to be benefited at the time by the fumigations, but later showed signs of recurrence of the disease. Several examples are quoted showing the toxic effects resulting from accidental and industrial inhalation of mercury vapour, the most remarkable being that of the British ship *Triumph* in 1810, when 200 sailors developed mercury poisoning and three died as the result of some mercury containers being broken in the hold. Systematic investigations of the effects of mercury vapour on animals either by exposure for short periods to heated mercury or for longer periods to ointments at room temperature produced the ordinary phenomena of all grades of mercury poisoning, and in addition inflammatory changes in the air-passages and lungs. Although neither theoretical considerations nor experimental nor clinical data appeared encouraging, the writers determined to investigate whether the method could be sufficiently improved to make it available in cases where other methods might be undesirable. Definite doses of mercury or calomel equivalent to those used in intramuscular injections were given by inhalation to two series of patients with active syphilitic lesions, one receiving calomel and the other mercury. In the calomel series inhalations of from 5 to 80 mg., totalling 225 mg. in two weeks, were taken by each of five patients. None of them showed any therapeutic response nor any renal changes. All but one exhibited definite bronchial irritation, salivation, and tenderness or œdema of the gums. In the other series, which was composed of six patients, inhalations of from 5 to 160 mg. of mercury in two weeks to 750 mg. in three weeks were given without causing any systemic or local effects. The writers conclude that administration of mercury compounds by inhalation has no advantage over oral administration, but, on the contrary, has the serious disadvantage of indefinite dosage and of the danger of respiratory irritation.

[1] American Journal of Dermatology and Syphilology, January, 1922.

ASYLUM ADMINISTRATION: THE DIVIDED CONTROL.

To the general public present the most enlightening feature of the opening session of the inquiry into Dr. Lomax's charges appears to have been the disclosure of the anomalous position of the Board of Control in relation to the visiting committees of the mental hospitals. The rules of the Board deal specifically enough with conditions of certification, admission, detention, mechanical restraint, seclusion, and so forth, and have all the force of the law of the land. But over the amenities of the life imposed on the patients—their diet, clothing, occupation, exercise, and amusements—the Board has no direct control, and its suggestions on these points may be adopted or rejected at the discretion of the visiting committee. It is a tribute to the moral influence wielded by this purely advisory and supervising body that the narrow limits of its actual legal powers are not more obvious. The Board cannot compel local authorities to extend or rebuild old-fashioned premises; to maintain an adequate staff—medical, nursing, or domestic; or to provide suitable modern hospital treatment for sick patients. In spite of these limitations representations made by the Board are so generally respected by local authorities that, being pressed to outline the procedure adopted when its wishes are ignored, Mr. A. H. Trevor, the senior commissioner, stated that this contingency had never arisen in his experience. But a disadvantage inherent from this purely advisory position is that the Board might be tempted not to press for certain reforms however desirable, so as not to alienate and embarrass a friendly committee. For example, one of the least controversial of the points now under investigation is the need for improvement in the quality, variation, cooking, and serving of the patients' meals. In the last annual report of the Board of Control it is stated frankly that in this respect some of the visiting committees and medical superintendents were "not as ready to adopt our suggestions as could be wished." This sentence shows no confidence that a minimal standard of dietary could be enforced; at the conference of medical superintendents and chairmen of visiting committees recently convened by Sir Frederick Willis,[1] it was definitely stated that the Ministry of Health possessed no power to compel visiting committees to supply adequate food to patients and that local authorities would resent such interference.

Owing to the complicated form of the statistics supplied[2] it is almost impossible to determine the proportion of the maintenance grant which is allocated to food in each mental hospital. The relevant items set out are (1) the maintenance of the garden and farm, which, as would be expected, appears to vary more or less inversely with (2) the cost of the provisions supplied from outside the asylum. These two items cannot be taken even as a rough guide to the weekly sum spent on food per patient, unless the proceeds of

[1] THE LANCET, Feb. 4th, 1922, p. 243.
[2] Seventh Report of the Board of Control, pp. 95 to 102.

the sale outside the asylum of some of the garden produce is first deducted. Unfortunately, this item is not stated separately, but is set down with money received from the sale of "articles and goods" (presumably manufactured) as well as garden produce. An important step towards realisation by the local authorities of the importance of an adequate, varied, and fresh dietary would be a balance-sheet on which the garden produce is shown to be taken over at market rates, or on which some other device is adopted to ensure easy comparison between expenditure on food at different hospitals. It does not follow, of course, that the cost of food taken by itself is an indication even of quality or quantity, certainly not of variation. The patients' milk bill or its equivalent in maintenance of cows would be no less if the medical officers enjoyed the cream therefrom, as alleged by Dr. Lomax. The medical superintendent of one of the largest Poor-law infirmaries recently achieved a considerable improvement, combined with a diminished expenditure, by the appointment of an expert domestic economist as sister-housekeeper instead of promoting a ward sister according to precedent. Still, though money spent is by no means an absolute sign, a comparison of costs in different mental hospitals in conjunction with their respective diet sheets, might afford valuable evidence of efficiency, or, on the other hand, of carelessness or leakage.

It is significant that among the proposals accepted by the conference already referred to as desirable, many coincide with those put forward in the memorandum just issued by the Quaker Medical Society, and again with those emphatically championed by Dr. Lomax. This unanimity encourages the hope that certain of these reforms may be speedily adopted, especially since the Board of Control appears to agree that they are desirable. An innovation proposed by the Board itself, in a report, as yet unpublished, on the Lomax charges, will be welcomed on all sides. When examining Mr. Trevor, Dr. Bedford Pierce quoted from this report a few lines expressing the hope that, in the future, voluntary women visitors would be allowed freely to enter public mental hospitals, with the double purpose of brightening the lives of the patients and forming a channel whereby the conditions inside asylums might become better known to the general public. Mr. Trevor denied that this was a new scheme, saying that it had been the feeling of the Board for some time that such visitors should be allowed. This would be an extension of the present system of visiting committees in the sense that the new visitors would be selected with discretion from leisured members of the general public and not from busy members of the local council. These appointments would involve no expense and might lead to greater public confidence in asylum administration, as well as to the comfort and happiness of the patients.

"ON THE EDGE OF THE PRIMÆVAL FOREST."

LIKE Arnold de Villanova, Dr. Albert Schweitzer is a doctor in three faculties—theology, medicine, and philosophy. He is a professor at the University of Strasburg and is also an accomplished organist, having been for some years the organist of the Paris Bach Society. Dr. Schweitzer had read much about the condition of the natives in tropical Africa and was struck by the miseries which they had to undergo from disease; so he made up his mind to study medicine and to go out as a medical missionary to do what he could to help. He graduated as M.D. in 1913, and, accompanied by his wife, who was a qualified nurse, left Europe for the Gaboon, under the auspices of the Paris Evangelical Mission in the same year. The station to which he was appointed was Lambarene on the Ogowe, a little south of the Equator and in longitude about 8° E. Here he and his wife worked for four and a half years. In his book entitled "On the Edge of the Primæval Forest" (London: A. and C. Black, Ltd. 1922. Pp. 180. 6s.) Dr. Schweitzer relates his experiences very simply, and it is evident that he did excellent work. Among his most prized possessions was a pedal piano, specially constructed for the tropics, with which the Bach Society of Paris had presented him so that he could keep up his practice even in Africa, and he tells us that in the intervals of his professional labours he solaced himself with playing. It would be interesting to know what the natives thought of, let us say, the great F major Toccata, that wonderful composition which sounds majestic even on a pedal piano, and on a big organ has much of the feeling of a tropical forest. Sleeping sicknesss, malaria, various surgical affections, especially hernia, leprosy, and tropical phagedæna, were the diseases which Dr. Schweitzer found most common. After his wife, his chief helper was a native named Joseph, who was extremely handy. He had started life as a cook and his anatomical knowledge was derived from the kitchen. Thus he would bring up a patient saying, "This woman has a pain in her left upper cutlet," or "This man's right 'gigot' hurts him." Among other matters Dr. Schweitzer was struck by the knowledge of poisons which exists among the native medicine-men, and of one in particular which apparently produces mania, ending, after a more or less extended period of time, in death. Dr. Schweitzer's remark as to general problems of missionary work and the relations of white to black are illuminating; he makes a shrewd observation as to the difference between Catholic and Protestant missions: "The Protestant mission puts in the first place the building up of Christian personalities, while the Catholic has in mind before all else the establishment on solid foundations of a church." In 1918 Dr. Schweitzer came home to recruit his health, but he tells us at the end of his book that he is going out again. We congratulate him both on his book and on his work.

TWENTY YEARS OF ANTIRABIES INOCULATION.

THE Bacteriological Institute of Lyons has recently published the collected results of its antirabies department, from the date of its foundation in 1900 up to the termination of its twentieth year of existence.[1] During this period a total of 12,886 persons has been treated coming from some 15 departments. As in many institutes, the method of treatment has been somewhat modified from that originally devised by Pasteur in the direction of greater intensity and the earlier use of the more virulent material. The course usually occupies 25 days, but is varied according to the site and severity of the bites. Treatment is commenced by the inoculation of rabbit's cords which have been dried for 7 days, the subsequent injections being made daily with cords of increasing virulence. The least attenuated virus in use is a cord which has been dried for 2 days and this is reached on the fifteenth day of treatment. In 11 of the 20 years covered by the report the mortality in effectively treated cases was nil; the average mortality over the whole period is 0·085 per cent. and the average number of persons treated 640 per annum. From the annual report of the Pasteur Institute of Paris[2] for the year 1920 we already know that during that year 1126 persons were treated with a mortality of 0·53 per cent. It is to be noted that this is the highest mortality which has obtained since 1888, the third year of function of the Institute. It is also worthy of note that 86 of the treated persons belonged to Category "A"—i.e., persons bitten by a dog proved to have been rabid—and that none of the deaths which occurred were in this class.

Amongst other information furnished by the Lyons report is evidence of the recrudescence of rabies which has occurred in France during and since the period of the war. This is attributable in the first place to the general disturbance of civilian life in the early stages of the combat, associated with the abandonment of dogs, especially in the invaded areas, the mobilisation

[1] Annales de l'Institut Pasteur, vol. xxxv., No. 12, December, 1921. [2] Ibid., vol. xxxv., No. 9, September, 1921.

of veterinary surgeons, and the relaxation of municipal muzzling regulations; and, in the second place and more latterly, to the importation of dogs by soldiers returning from expeditionary units in the East—a condition analogous to that responsible for the recent reappearance of canine rabies in this country. The results of the Pasteur treatment obtained in the provincial laboratory compare very favourably with those of the parent institute in Paris, although the same classification of patients is not in use, and hence direct comparison is not possible. It is evident that a large number of persons undergoing treatment at Lyons are in very slight danger of the disease, since about a third of the patients are persons who have been licked by rabid animals and in whom the chances of developing the disease are presumably slight. The figures for the mortality do not give us an accurate picture of the death-rate in persons who have been bitten by rabid animals, but rather of that obtaining in persons in whom the Pasteur treatment has had full scope to do its best. Cases ending fatally during the treatment, or within 15 days of its termination, are not included in the statistics, since it is recognised that it is only some 15 days after the end of the treatment that immunity is fully established. If we take 20 days as the average duration of the course, and add to this the 15 days which must subsequently elapse before the patient enters into the statistics of the Institute, we find that all cases in which the incubation period is less than 35 days, and in which the disease evolves normally in spite of the treatment, are excluded.

Trousseau tells us, in his vivid account of this malady, that the average length of the incubation period is from one to three months, so that a certain number of cases evolving normally will not appear in the results of the Institute, which thus come to exclude to a certain extent cases of short incubation. Though probably more academically correct, this narrowed presentation of the figures does not, therefore, satisfy the desire to know in a more general fashion what are the chances of an individual who is bitten by a mad dog of developing rabies when treated on modern lines.

ECONOMY AND RESIDENTIAL TREATMENT FOR TUBERCULOSIS.

ANYTHING would be a calamity that postpones indefinitely the resuscitation of a number of public health activities which had only begun to recover from the state of suspended animation imposed on them by the war. It is a welcome relief to meet with one product of the economy campaign which may have positive constructive value to public health administrators and through them to the community at large. This pleasing phenomenon appears in the form of a circular (No. 280) issued by the Ministry of Health on Jan. 17th last to the authorities responsible for the provision of residential treatment for tuberculosis. The circular discusses the general principles of economy in sanatorium administration.

We would direct attention in particular to the second portion of the circular, which brings under review the cost of residential treatment. After comparison of the claims received from local authorities in respect of their expenditure during 1920–21, the Ministry of Health has been struck by the wide variations in the costs involved in residential treatment. In respect of salaries, for example, the cost per patient per week varied from less than 9*s.* to over £1; the cost of provisions per patient week from below 21*s.* to over 35*s.*; that for drugs from less than 1*s.* up to 3*s.* 6*d.* per patient week. This information in itself, scanty though it be, is of real value to local authorities responsible for the treatment of tuberculosis, in that it gives them an opportunity of comparing their expenditure on certain definite items with that of other authorities similarly placed. Allowing for the variations dependent on the type of patient under treatment, the geographical position and structure of the institution, and other local factors, the analysis of expenditure on these few items is likely to throw unexpected light on avoidable waste in some areas. Obviously, this is only the first stage in a much more intimate analysis, which can be rendered of value only by verifying the methods of tabulation of costs in practice in the numerous areas concerned. It is therefore encouraging to find that the Ministry of Health proposes to submit a model form of summary of accounts for consideration by representatives of the County Councils Association, the Association of Municipal Corporations, the Society of Superintendents of Tuberculosis Institutions, the County Accountants Society, and the Institute of Municipal Treasurers and Accountants, in conjunction with officers of the Ministry. Having established a common basis of statement of accounts, the Ministry may publish an annual detailed analysis of the costs in the various areas. There can be no question that such a procedure would have a most beneficial effect in stimulating interest in the whole problem of residential treatment, and in concentrating attention on the essential while discouraging the non-essential features of such treatment. The overhauling of administrative machinery would before long lead to a material improvement in the methods and in the results of treatment.

HEALTH AND INDUSTRIAL OUTPUT.

THE study of human efficiency in industry promises great returns in productivity, and yet 12 months ago we narrowly escaped throwing away our lead in this study, as may be read between the lines of the second annual report of the Industrial Fatigue Research Board [1] which covers a period of 18 months ending September, 1921. During this period, when the foundations of a new science were just begun, the career of the Board nearly terminated at short notice, but reconstruction has taken place and the Board has now become an integral part of the organisation of the Medical Research Council, who have also established four allied committees to deal with industrial health statistics, with the physiology of muscular work, with the physiology of the respiratory and cardio-vascular systems, and with industrial psychology. The Board, in view of its financial restrictions, now appeals to industries in their own interests to assume partial responsibility for investigations. Every science must have means of measurement and the Board, having proved their value, has employed, as measures of human efficiency, output (with regard to quantity and quality), sickness and mortality records, labour turnover, lost time, and accident frequency. Investigations have established that hours of work should vary for heavy, moderately heavy, and light labour, and that if hours are over-long output can be increased by reducing them, but that this increase is only to be expected where the human element, rather than the machine, rules the pace. Indications that spells of work are over-long are to be found in a fall of output as the spell lengthens; under good conditions output should rather improve up to the end of each spell, throughout the day, and from day to day throughout the week. Spells of work when too long ought to be broken by organised rest pauses instead of allowing workers to interpolate their own unorganised pauses. Seasonal influences due to temperature, humidity, and lighting are found to be considerable and to be controllable by well-planned ventilation and illumination. Attention to these principles, underlying human efficiency, which are steadily emerging spells the difference between profit or loss on the one hand, and pleasure in work or industrial discontent on the other.

Even when everything has been done to make the conditions of work with regard to hours of employment and the environment of the worker satisfactory, still there remain other problems for inquiry. Vocational guidance to direct newcomers to work for which they are fitted, and vocational selection to pick out those suited for the work in hand are matters

[1] Second Annual Report of the Industrial Fatigue Research Board to September, 1921. H.M. Stationery Office. 1922. 1*s.* 6*d.*

calling urgently for investigation. In both these directions beginnings have already been made. At a later stage the manual labourer needs instruction as to how best to apply his energy. Left to himself he tends to be wasteful and uneconomical in his movements. Here the work of the Board promises the most rapid returns. Those familiar with the pioneer work done by Taylor and Gilbreth will appreciate how in this direction the Board's initial efforts promise to revolutionise previous ideas; the end kept in view is to save the worker rather than to increase output; but the result has been in every case not only to save the worker but greatly to increase output. The scope of the activities of the Board from which such laws as those indicated above are emerging has been wide. Investigations have been conducted in shell-making, in blast furnaces, in foundries, in silk-weaving, in metal polishing, in the tinplate industry, in boot and shoe manufacture, in the iron and steel industry, in cotton-spinning, the manufacture of sweets, in the cutlery trade, in laundries, to mention only some. The prospect which this new science holds out as within the grasp of industry is nothing less than an increase from 50 to 100 per cent. in output for the same wages paid, and a vast diminution of industrial sickness with its heavy call upon National Health Insurance funds. These tangible benefits may well be accompanied by a decrease in social unrest.

PUBLIC HEALTH AND THE CITY OF LONDON.

ON Friday, Feb. 17th, the Lord Mayor of London, Sir Charles Baddeley, entertained the President and the Council of the Society of Medical Officers of Health to luncheon at the Mansion House. Among the guests of the Lord Mayor, with whom was the Lady Mayoress, were Sir Alfred Mond, Minister of Health; Sir George Newman, Chief Medical Officer to the Ministry; Lieut.-Colonel F. E. Fremantle, M.P.; Alderman De Courcy Moore; Mr. Sheriff Mills McKay; Sir Dawson Williams; Sir Squire Sprigge; Dr. J. W. Howarth, M.O.H., City of London, and President of the Society of Medical Officers of Health; Mrs. Howarth; and Mr. G. S. Elliston, Secretary to the Society of Medical Officers of Health.

Sir Alfred Mond, in a simple and earnest speech, pointed out that even in the days of necessary retrenchment it was false economy to underpay those who guarded public health, true economy being expressed in the policy of keeping the medical service of the country up to the highest level, though the coat must be cut according to its cloth. Dr. Howarth, in an eloquent address, alluded to the sanitary policy of the City of London as having throughout the history of sanitation led the way not only in this country and all its dependencies, but on the continent and in America. He showed that the progressive action of the City in health matters had caused our country to be looked up to throughout the world as the pioneer in preventive sanitation. The Lord Mayor, replying to a vote of thanks, proposed by Lieut.-Colonel Fremantle, claimed that the City of London was at the time the healthiest in the world, and expressed the determination of the corporation to maintain this position.

A DIPLOMA IN TUBERCULOSIS.

SOME two years ago we commented[1] on a demand by Sir Henry Gauvain for the establishment of a special diploma in tuberculosis and shortly after reported a discussion by the Tuberculosis Society on this question.[2] This suggestion has now materialised, for the Welsh National School of Medicine announce the institution of a tuberculosis diseases diploma. Candidates must be qualified, at least 25 years of age, and have held, for a period of not less than five years, whole-time appointments for work on tuberculosis. Alternatively, provided he has been qualified for at least one year, a candidate will be admitted to examination on production of a certificate of satisfactory pursuance of a six months' course of study of the clinical and epidemiological aspects of tuberculosis at a recognised centre, together with evidence of three months' practical laboratory work and three months' attendance at a tuberculosis institute or dispensary. The examination for the diploma will be divided into two parts, of which the first will consist of a written examination on the clinical and epidemiological problems of tuberculosis as well as oral and practical work, while the second will comprise a written and practical examination on the pathology and bacteriology of tuberculosis. Under certain given circumstances Part II. may be remitted. The first examination will be held in July, 1922, and post-graduate courses of instruction in preparation therefor will shortly be started under the direction of Prof. S. Lyle Cummins, who believes that the institution of a standard examination, study for which must include knowledge of surgical conditions, will do much to improve the methods of dealing with tuberculous patients in the future.

To single out one chronic inflammatory process for separate study, and to develop a race of medical men specially qualified in its diagnosis and treatment, is a policy which cannot be regarded as strictly logical. But since the balance has already been disturbed by the creation of a separate service of tuberculosis officers, it is only wise to see that they are well equipped. Whether this object will be best achieved by a special tuberculosis diseases diploma (T.D.D.) or by the revision of the curriculum for the D.P.H. is another question. The time has perhaps come for an investigation and a revision of the conditions under which various bodies issue the last-named diploma. The syllabus as now planned caters chiefly for the needs of the M.O.H., whereas those aiming at the specialised branches learn an unnecessary amount of sanitary law and too little of their own special subjects. Now that the whole subject has grown to such unwieldy proportions, a diploma of public health can fairly be compared with other higher examinations open only to qualified men. The London graduate may take the M.D. in Pathology, Mental Diseases, Midwifery, State Medicine, and Tropical Medicine, as well as in Medicine proper, in every case submitting one paper in general medicine. There seems no good reason why a similar plan should not be adopted for the D.P.H. Supposing a medical men who had taken a D.P.H. in tuberculosis wished at a later date to proceed to a position as medical officer of health, he might be eligible on taking an additional paper in that part of the curriculum which he had previously omitted. Without wishing in any way to disparage the excellent scheme of the Welsh National School of Medicine, we would suggest that the inadequate place allotted to the study of tuberculosis in most of the present curricula for the D.P.H. also demands attention.

[1] THE LANCET, 1920, i., 275. [2] Ibid., 608.

THE FELLOWSHIP OF MEDICINE.

WE have heard that, in quarters where such an error would have serious consequences, a belief has gained ground that the staffs of the London hospitals are no longer working in connexion with the Fellowship of Medicine. For some time three of the metropolitan hospitals have not been affiliated to the Fellowship, but the report we allude to above is a misrepresentation of the facts. All the honorary officers and teachers of the hospitals, who are mentioned weekly in the *Bulletin*, are working with the Fellowship, and assisting in the special courses now laid down. We learn that there is at the moment a sum of £1270 remaining to be distributed among the hospitals and teachers, in proportion to the services rendered, making up a total disbursement by the Fellowship of £4400. The sum is small compared to the work done, but it is not negligible, and is an excellent earnest of what may be accomplished in time by organisation and coöperation.

CARBON TETRACHLORIDE IN ANKYLOSTOMIASIS.

RECENT work by M. C. Hall, senior zoologist to the U.S. Bureau of Animal Industry, would seem to indicate that in carbon tetrachloride we possess an anthelmintic of great potency. Carbon tetrachloride is a heavy volatile chloroform-like liquid, which is more efficient than the latter in its anthelmintic properties. Chloroform itself was originally utilised therapeutically in ankylostomiasis by Alessandrini and is the active ingredient in Hermann's mixture; in combination with castor oil and eucalyptus[1] it has been recommended in this disease by Manson and other authorities. Preliminary tests[2] were performed with carbon tetrachloride on 30 dogs infested with *Ankylostoma caninum*. The results are reported as being most gratifying. On administration of 0·3 c.cm. of this drug for every kilogramme of live weight, or a dose of 3 c.cm. for an average-sized dog of 22 lb., the hookworms were expelled. Such striking results Hall has been unable to obtain with any other previously known anthelmintic. The drug is best exhibited in hard gelatin capsules to the animals after a fast of 18 hours and without previous purgation; apparently it is equally efficacious in removing ascarids as well as the blood-sucking strongyles from horses and swine.

Some 50 years ago the properties of carbon tetrachloride as an anæsthetic were investigated by Sanson, Simpson, and others, but since that time it has been neglected, following the statement by the second-named authority that it was more depressing to the heart than chloroform. Others have found it useful for headache, dysmenorrhœa or toothaches. Inhalation of this drug when used as a shampoo[3] has caused fatal results, but as pointed out by Waller its toxicity is increased one-third by the presence of carbon bisulphide, which may be present as an impurity. In order to obtain first-hand information upon the oral administration of carbon tetrachloride, Hall swallowed 3 c.cm. in hard gelatin-covered capsules with the result that no untoward symptoms were noted. The effect on monkeys was similar to that observed in man. In a recent number of the *Times* appears a telegram from Suva, Fiji, in which we learn that Mr. Hall has conducted therapeutic tests on coolies suffering from ankylostomiasis and has been able to report that 98 per cent. of the worms were removed by a single dose of carbon tetrachloride almost without symptoms. If these statements are correct, the advantages to be derived from this method of treatment are obvious. The disadvantages of the thymol treatment, as recommended by the Rockefeller commission, are, briefly, the cost, the occasional toxic effects, and the somewhat elaborate preparation of the patient. It is possible that in these respects the use of carbon tetrachloride may have advantages, and the cost is only one-eighth of the older method.

IN the return from Scotland for the week ending Feb. 18th, deaths from influenza numbered 95, or 78 fewer than in the previous week.

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[1] Jour. Amer. Vet. Med. Assoc., vol. lv., new series, vol. viii., No. 6, September, 1919, pp. 652–659.
[2] Jour. Amer. Med. Assoc., vol. lxxvii., No. 21, Nov. 19th, 1921, pp. 1641–1643.
[3] THE LANCET, 1909, vol. ii., p. 1162.

WELSH NATIONAL SCHOOL OF MEDICINE APPEAL.—At a recent meeting of the Welsh Committee of the British Medical Association letters were read from Lord Kenyon and Prof. Ewen J. Maclean in support of the claims of the medical school, and the following resolution was passed:—

That this Committee warmly approves of the appeal of the Welsh National School of Medicine, and is of the opinion that it deserves the cordial support of the medical profession in Wales, and that the letters of Lord Kenyon and Prof. Ewen J. Maclean be sent to the divisions and branches in Wales with a suggestion that the division or branch, or both, should accept the offer of Lord Kenyon to invite the Committee of the appeal to send a representative to address a meeting of the profession.

ECONOMY IN HEALTH ADMINISTRATION:
INTERIM REPORT OF COMMITTEE ON NATIONAL EXPENDITURE.

(*Concluded from p. 339.*)

WE summarised last week the recommendations of the Geddes Committee in regard to the public health services proper.

Health Insurance.

In reviewing the position of National Health Insurance the Committee was greatly impressed by the fact, not generally realised, that many costly alterations have been made in the original scheme on which the 1911 Act was based, and that, in the main, the taxpayer has shouldered the burden, thus:—

1. *Medical benefit*—i.e., the provision made for doctors and drugs—has been increased by successive steps from the original 6*s.* 6*d.* a head to 13*s.* 9*d.* a head, of which 4*s.* 3*d.* was at the sole expense of the taxpayer and in addition to the normal State contribution which he as taxpayer has also to provide. On the first day of the present year the 4*s.* 3*d.* was reduced to 2*s.* 9*d.*, owing to the reduction of 1*s.* 6*d.* in the capitation grant.

2. *Sickness Claims of Women.*—It was found in practice that these claims, especially on behalf of married women, greatly exceeded the original actuarial estimate. The entire cost of remedying matters was put on the taxpayer, a grant-in-aid of £350,000 a year, with retrospective effect being provided by the National Health Insurance Act, 1918.

3. *Approved Society Finance.*—In 1917 groundless fears were entertained that the finances of many approved societies would be disastrously affected by the war. By the Act quoted above all societies were required to pay one-eighth of their normal provision for contingencies into a central fund, from which the weaker societies were to be assisted if necessary. To this fund the taxpayer has contributed £150,000 a year for five years, which, with the contributions from the societies, has produced a central fund of £2,000,000, not a twentieth part of which has been required. Under an Act obtained in 1921 this particular grant has been suspended.

4. *Benefits and Contributions* were both raised in 1920, but in addition to his share of the increased contributions the taxpayer assumed full responsibility for a charge of £350,000 per annum in respect of the old sanatorium benefit, which up till then had been a charge on the insurance funds of the approved societies.

5. *Administration.*—Reference has already been made to the cost of medical referee consultants and of the index clearance scheme. It does not appear to the Committee that the taxpayer should be called upon to pay these charges of the administration of the insurance scheme, which is in itself thoroughly solvent.

The Committee considers that a revision of health insurance finance is necessary. Variation in the conditions of the scheme should not lay the Government open to any charge of breach of faith, seeing that the original arrangements have so frequently been modified in the interests of the other parties thereto.

Position of Approved Societies.

The recent quinquennial valuation showed that, in addition to the central fund of £2,000,000, the individual approved societies held surpluses amounting in all to £16,000,000, of which roughly £7,000,000 is held in reserve and £9,000,000 is at the disposal of the societies for distribution in additional benefits. This disposable surplus of £9,000,000 will in due course attract a grant of £2,600,000, being the two-ninths proportion of additional benefits payable by the State. The report goes on to say:—

These surpluses are largely due to the war. Owing to the inclusion in the National Health Insurance Scheme of members of all ages a reserve value for each member had to be created. As the original members die, the necessity for creating a reserve value disappears and the large number of war casualties has consequently improved the financial position of the funds of approved societies. At the same time the death of these men has placed a burden on the taxpayer in respect of pensions to widows and other dependents. Neither have the societies had to incur additional expense as regards wounded men because they were recouped by the State in full any extra cost incurred in excess of what they would have had to pay in respect of an equal number of men under peace conditions—i.e., they were entirely relieved of the special burden which war would otherwise have imposed on their funds—and, moreover, they reaped considerable benefits.

Suggested Increased Contribution.

As a result of the various modifications of the 1911 scheme indicated above, the estimated Exchequer cost of National Health Insurance for Great Britain in the current financial year is approximately £10,500,000. The provisional estimate for 1922–23 is about £9,200,000, the reduction being brought about largely by the reduction of 1*s.* 6*d.* (11*s.* to 9*s.* 6*d.*) in the capitation fee. The Committee considers it essential that the State's share of the health insurance burden should be further reduced by legislation.

This could be done, it is suggested, by increasing the total contributions from employers and employed by ½*d.* a week in each case, and it is recommended that this change be introduced on July 1st next, before which date the contributions in respect of unemployed workers' dependents will have ceased. It would also permit of the abolition of the Exchequer grant for medical services. As the increase in contributions is suggested with a view to relieving the taxpayer, these additions would not carry any State grant. The total saving (including Scotland) to the Exchequer would be about £2,200,000 a year.

A letter from Mr. A. W. Watson, Government Actuary, to Sir Eric Geddes, which appears as an appendix to the report, contains definite recommendations as to the allocation of the new contribution of 1*d.* a week.

The amount produced by 1*d.* a week without State grant would be nearly 4*s.* a head, and I should recommend that 2*s.* 6*d.* of this be applied to medical benefit, leaving nearly 1*s.* 6*d.* to be utilised in other directions, possibly under departmental supervision, in giving approved societies greater financial freedom than they possess at present to give effect to Section 21 of the Act of 1911, relating to power to subscribe to hospitals, dispensaries, &c., and to provide for nursing services.

The proposal to increase the contribution by a half-penny per week each from employers and workpeople was embodied in the Bill presented by the Minister of Health on Feb. 9th.

Ministry of Pensions Estimates.

War pension commitments have been estimated at a capital value of £1,400 million, with an additional £112 million for schemes undertaken by civil departments other than the Ministry of Pensions. The estimated expenditure of the Ministry has been put at £111 million for 1921–22 and £96 million for 1922–23, a reduction of 13·6 per cent., the greater part of the reduction being due to an over-estimate in the previous years. The latter estimate may be analysed thus (the unit being, of course, £1000):—

	£1000.
Pensions (excluding parents' pensions) ..	67,170
Treatment	13,455
Parents' pensions	9,230
Special grants, &c.	789
Administration	5,722
	96,366

The present rates of pension are based on the recommendations of the Select Committee on Pensions of 1919; they may vary with the cost of living, though it is provided that no change shall be made before April 1st, 1923, when revision will take place on the basis of the ascertained cost of living in the calendar year 1922. The standard for comparison is the cost of living in 1919 (115 per cent. above pre-war) and for every 10 points fall the reduction in the pension charge will be at the rate of £3,124,000 a year. The prescribed definite minimum rates of pension become operative when the cost of living has fallen to 77 per cent. above pre-war. At this point the maximum reduction will have been reached, and on the present pensions would amount to £11,750,000 per annum. The existing rates of pension were fixed before the cost of living had reached its maximum and the decision not to vary rates before April, 1923, is now operating in favour of the pensioner, although until recently it operated in favour of the taxpayer.

The Cost of Pensioners' Treatment.

A disabled man is entitled to free medical treatment when it is certified that he needs it, and, if he is deemed unable in consequence to provide for his own support and that of his family, he receives treatment allowances in addition to his pension. The estimated cost to the Ministry in 1922–23 of providing treatment will be £6,919,000 while the treatment allowances paid will amount to £6,536,000, making a total estimated expenditure of £13,455,000. This great expenditure at a date so far from the cessation of hostilities seems to the Committee to call for investigation.

The actual numbers of men under treatment at the most recent period available to the Committee are shown in Table I.

TABLE I.

Nature of treatment.	Number on June 30th, 1920.	Number on June 30th, 1921.	Average duration of treatment.
In-patient—			
Ministry of Pensions hospitals.	7,909	11,600	13 weeks.
Civil hospitals	10,100	9,140	13 weeks.
Treatment and training centres.	1,500	2,230	9 months.
Sanatoria	5,000	4,630	15 weeks.
Asylums	5,000	5,800	Permanent.
Out-patient—			
Ministry of Pensions clinics.	90,605	66,000	104 days.
Civil hospitals		40,000	96 days.
Home treatment	25,853	15,415	15½ weeks.
Total	145,958	154,815	16 weeks.

If the number of men under treatment on June 30th, 1921, continued constant for 12 months, approximately 500,000 spells of treatment would be given during that period.

Apart from any question of a right to treatment, it has been claimed that the expenditure is not wholly lost to the taxpayer because the men's disabilities are reduced by treatment and the future charge for their pensions thereby lessened. But, the report goes on, the prospect of further improvement from treatment, when three or four years have elapsed from discharge, appears to be small in most cases, and the War Pensions Act, 1921, embodies the principle of fixing permanent pensions after a lapse of four years.

Explanation of the increase in the numbers under treatment between June, 1920, and June, 1921, is afforded by the fact of a waiting list of men seeking treatment, and the recent scarcity of employment leading to new claims to compensation being put forward by men on account of minor disabilities for which they had not made a claim before. It cannot be doubted, the Committee thinks, that in many cases a man receives more while undergoing treatment than he could earn if in health.

Suggested Economies in Treatment.

In the Committee's opinion the question of the cost of providing treatment requires early consideration, and the following suggestions are made as to the general lines on which economies can be obtained:—

(*a*) The accommodation at Ministry hospitals is rather under 14,000 beds, the number of beds occupied on June 30th, 1921, was 11,600, and unoccupied 2400. The accommodation is being steadily decreased as opportunity offers, but more rapid progress is desirable.

(*b*) There are 11,856 beds in Admiralty and War Office hospitals in this country, of which 5335 are filled and 6521 are unoccupied. Altogether, in these three departments the taxpayer is providing 25,856 beds, and of that number 9821 beds are unoccupied. Immediate steps should be taken to utilise spare accommodation in naval and military hospitals for pensioners under treatment, thus enabling buildings hired by Ministry of Pensions to be surrendered.

(*c*) The Committee is not satisfied that the fullest possible use is being made of civil hospitals. Including cost of accommodation, each patient in a Ministry of Pensions hospital is costing on the average 10*s.* 11*d.* a day, whereas the capitation rate of civil hospitals averages 9*s.* a day. General surgical and medical cases should be treated either in civil hospitals or in naval or military hospitals.

(*d*) Various reforms in the matter of treatment are proposed as and when pensions are made permanent: the question of introducing these reforms earlier should be considered. Strict limitation of home treatment should be considered, as it is admittedly unsatisfactory. Treatment allowances are

on a generous scale and become even more so in cases where a man is entitled to health insurance benefit, rank allowance, or service pension. A man while in hospital receives 40*s.* a week, in addition to generous allowances in respect of his wife and children, and out of this he only contributes 19*s.* per week towards his maintenance whilst in hospital. Having regard to the cost of his maintenance in hospital of from 63*s.* to 76*s.* 5*d.* per week, an increase in this contribution can fairly be asked for.

(*e*) 1883 orderlies are employed in Ministry hospitals, equivalent to one orderly for six patients. Patients who are in a condition to do so should do more light work and thus reduce this heavy item of cost.

The annual savings which would result from adoption of these suggestions are estimated at: Reduction of allowances by amounts received for health insurance benefits (£1,000,000); home treatment reduced by 50 per cent. (£500,000); allowance to the wife of a man undergoing treatment made 10*s.* a week, the same as in the case of the wife of a totally disabled man (£416,000); contribution towards maintenance whilst in hospital raised from 19*s.* to 24*s.* (£350,000).

Administration of Pensions.

The estimated cost of administration in 1922–23, excluding £1,400,000 for the staffs of hospitals and institutions included as part of the cost of treatment, is shown in Table II.

TABLE II.

	Salaries and wages.	Travelling and incidental expenses.
	£	£
Headquarters and regional staffs	2,690,000	81,000
Medical staffs	1,777,000	40,000
Local committee staffs	934,000	200,000
	£5,401,000	£321,000

Sweeping changes are being made in administration as a result of the War Pensions Act, 1921, which converted the local pensions committees from administrative bodies to advisory committees, and also introduced the principle of fixing permanent pensions. Until these reforms are completed a true judgment can hardly be formed of the size of the staff required, but large reductions should eventually be possible. The Committee suggests that the pay of the temporary administrative medical staff of the Department, numbering 324, which averages £972 per annum, requires reconsideration in view of the fall of the cost of living and the recent reduction in the panel capitation fee.

Care of Mental Deficients.

The revised estimate of the Board of Control for 1922–23 is £531,440. Contributions under this vote to local authorities in England and Wales are in respect of the provision and maintenance of accommodation for mental defectives, who are, generally speaking, incurable. The contributions do not cover cases of general lunacy. The Mental Deficiency Act was only passed in 1913, so that the expenditure of £21,464 during the year 1913–14 does not reflect the operation of the Act. The Exchequer pays 50 per cent. of the expenditure by local authorities approved by the Department. The average cost per head varied from £58 to as high as £320 in local authority institutions, and from £41 to £76 in voluntary institutions. The highest cost was explained as being due to the small number of patients in relation to certified accommodation, but comparing institutions of similar size the cost of some was found practically double that of others. Taking the item of food alone, the cost per head at one institution was £19, and at another with a similar number of patients this item cost £33. The number of places at present provided in the institutions to which the State contributes is 15,000, and there are now 9000 patients in those institutions. There are still a large number of mentally defective persons outside the institutions. The Committee regards the care of mental defectives as an activity essential to the physical and moral health of the nation, and suggests that a larger number could be received within the limit of the estimates—there are at present 6000 places unoccupied—and advises a change to a per capita basis of State subvention, coupled with provisions to ensure adequate treatment and economical management.

In Scotland there is accommodation in institutions for 1477 defectives and 1268 patients are resident. The average cost per head is lower than in England but varies from £51 to £93 at the three principal institutions, the most costly being administered by the local authority.

Women Patrols.

Under the heading of expenditure on police and prisons, the Committee has considered the question of the employment of the women patrols, 110 in number, whose pay is 10*s.* a week less than that of the uniformed constable. Their powers, the report states, are very limited, and their utility from a police point of view, on the evidence submitted, negligible. "We do not think that in present circumstances," the report runs, "this expenditure can be justified."

Government Chemist.

The expenditure of the Government Chemist in 1913–14 was £21,200 and is estimated at £57,100 for 1921–22 and £50,100 for 1922–23. The staff employed numbers 152 (permanent) and 50 (temporary), including about 100 revenue officers whose substantive salaries are borne on the Customs Vote. The Government Chemist advises Government Departments, Committees, and Parliament on all questions requiring the advice of expert chemists, with the exception of such work as is performed by the fighting departments. The work includes the analysis of samples in connexion with the Assessment to Revenue and Drawback, and with the construction of armament for the Admiralty and Air Ministry, the chemical work of the Geological Survey, the analysis of samples supplied to Government Departments on tender or contract, the analysis of samples of food and other supplies for the War Office, and of produce for the Ministry of Agriculture; and the analysis of samples referred by Magistrates under the Food and Drugs Act. The number of samples dealt with steadily maintains the pre-war average of about 350,000 a year, while the field covered by these analyses is more varied than previously and much fundamental work is thereby involved. A large quantity of work of a new kind has recently been thrown upon the Department in connexion with the Safeguarding of Industries Act, the Importation of Dyestuffs (Regulation) Act, and the Dangerous Drugs Act. The Committee makes no recommendation in regard to reduction.

THE SEVENTEEN SALVARSAN COMMANDMENTS OF THE GERMAN REICHSGESUNDHEITSRAT.

THE recommendations of the German Reichsgesundheitsrat which follow are in somewhat close resemblance to those issued by the Medical Research Committee.[1] The German commandments include adiposity in the list of relative contra-indications, and omit a constitutional tendency to skin diseases mentioned by the British Salvarsan Committee. The initial German dosage is, on the whole, slightly lower than that employed in this country, and betrays a wholesome fear of "encephalitis hæmorrhagica," a consequence of arsenobenzol injections which figures more prominently in German reports than ours, and is, doubtless, due largely to excessive size of initial doses. A notable difference from British practice is the recommendation not to exceed a dose of 0·3 g. salvarsan, 0·45 g. neosalvarsan or sodium salvarsan, or 0·25 g. silver salvarsan for women (or one-third

[1] Medical Research Committee. Reports of the Special Committee upon the Manufacture, Biological Testing, and Clinical Administration of Salvarsan and of its Substitutes. No. 1. Special Report Series No. 44, 1919.

higher for young, healthy adult males) at any stage in the treatment. On the other hand, the total amount to be administered in six weeks—viz., 2·5–3 g. salvarsan, or 4–5 g. neosalvarsan—with permission to increase, "provided that the patient's reaction during the treatment is satisfactory," may prove to be rather more intensive treatment than is altogether safe. In this connexion L. W. Harrison's observations during the late war may be recalled.[2] After the reduction of the intensity of the arsenobenzol treatment from 2·8 g. "606" in 50 days to 2·6 g. in 57 days there was a notable reduction in the incidence of jaundice and dermatitis in British military V.D. hospitals, the Lichfield Central Hospital reporting 11 cases of dermatitis and 12 of jaundice against 19,100 injections under the old course, and only two of each against 11,734 injections under the new. The permission to increase the intensity of the course, provided that the patient's reaction during the treatment is satisfactory, appears to ignore the fact that the patient's reaction may be perfectly satisfactory, yet he may develop dermatitis three months, or jaundice as long as 12 months after the last injection. It would appear to be safer to put the maximum intensity of treatment rather lower than that permitted by the Reichsgesundheitsrat.

The Commandments.

During and after the war the subject of salvarsan assumed proportions of considerable political importance in Germany. Questions were repeatedly asked in the Reichstag about salvarsan fatalities, and among the many accusations hurtling about was the very serious charge that the leading medical journals were suppressing the publication of these fatalities because their interest in salvarsan was said to be partly financial. The upshot of all this agitation was the appointment of a commission to inquire into all the aspects of the matter. Towards the end of 1921 the German Reichsgesundheitsrat issued through the Reichsgesundheitsamt a pronouncement on the administration of salvarsan under 17 headings which may be regarded as the considered opinion of the leading authorities in Germany on the administration of salvarsan. The following is a slightly abbreviated translation of this document:—

1. The salvarsan preparations can be given in all the manifestations of syphilis; its use is especially effective in the very earliest stage of the disease. The sooner salvarsan treatment is instituted after infection, the more favourable is the prospect of an early cure.

2. A condition for the successful employment of salvarsan preparations and for the avoidance of disturbances is complete mastery of the technique and close observation of the patient before, during, and after treatment.

3. Before treatment is instituted, the patient should be carefully questioned as to previous diseases, and a careful examination should be made (heart and urine) of his present condition.

4. In the presence of even slight disturbances, such as chills, sore-throats, and the like, injections of salvarsan should be given with the greatest care, and they should be dispensed with altogether in the presence of more serious complications, and when the last injection has not been tolerated well and the patient is still suffering from its effects. It is not desirable to give salvarsan injections on an empty or over-full stomach.

5. Special care is required in the administration of salvarsan when the patient is much underfed, cachectic, very anæmic, or the subject of status lymphaticus, diabetes, goitre, Graves's disease, Addison's disease, pulmonary tuberculosis, diseases of the heart, blood-vessels, liver and the other organs of digestion, adiposity, alcoholism, epilepsy, and diseases of the kidneys. In such cases the administration of salvarsan should first be tentative, and the normal dosage should not be given till toleration for smaller doses has been proven. The same precautions are necessary in cases of syphilis with symptoms referable to the nervous system or other vital organs, and to patients who have reacted unsatisfactorily to earlier injections of salvarsan.

6. The dosage of an intravenous injection must be determined by the patient's weight and general condition, and by the position, character, severity, and distribution of the syphilitic manifestations. Small injections should be given at first—i.e., 0·1–0·2 g. salvarsan, 0·15–0·3 neo-salvarsan or sodium salvarsan, or 0·1 silver salvarsan; young healthy males may be given 0·3 salvarsan, 0·45 neo-salvarsan or sodium salvarsan, or 0·25 silver salvarsan. Later in the treatment larger doses—i.e., 0·3–0·4 salvarsan, 0·45–0·6 neo-salvarsan, or sodium salvarsan, or 0·25–0·3 silver salvarsan, are to be recommended. Even when the patient is a young healthy male and an abortive single injection is given, the dose should not exceed 0·4 salvarsan, 0·6 neo-salvarsan or sodium salvarsan, or 0·3 silver salvarsan. The maximum doses of a single injection for women should not exceed 0·3 salvarsan, 0·45 neo-salvarsan or sodium salvarsan, or 0·25 silver salvarsan. The dosage for children should be determined by their weight and general health, and for infants 0·005–0·0075 salvarsan, 0·0075–0·015 neo-salvarsan or sodium salvarsan, or 0·003–0·006 silver salvarsan per kilo body-weight should be given.

7. The interval between large injections should be three to seven days, and this interval may be reduced when smaller doses are given.

8. The total quantity of salvarsan given by intravenous injection in the course of six weeks should not, as a rule, exceed 2·5–3 g. salvarsan, 4–5 neo-salvarsan or sodium salvarsan, or 2–2·5 silver salvarsan. Under exceptional circumstances these doses may be exceeded, provided the patient's reaction during the treatment is satisfactory. When salvarsan is combined with mercury particularly close observation of the patient is required.

9. During a course of treatment, and particularly on the day of an injection, the patient must not overstrain himself physically, or indulge in any excesses. It is desirable that he should rest quietly for a quarter of an hour on his bed after an injection. He should be well fed while undergoing treatment.

10. The patient should be taught to observe and at once report symptoms such as headache, general malaise, giddiness, vomiting, fever, attacks of fainting, sleeplessness, flushing of the face, hæmorrhages, rashes, and diminished secretion of urine.

11. The above symptoms should always be regarded as warnings, and when they are severe, the treatment should be temporarily discontinued, the next injection not being given till at least eight days after a complete return to normal. And then a smaller dose should be given or another salvarsan preparation tried. After a first injection it is not rare for a rapidly transitory rise of temperature to occur; this is no indication for discontinuing the treatment. But rises of temperature occurring later in the course of treatment must always be regarded with suspicion.

12. Rashes which when slight and transient, are easily overlooked, should be carefully sought for, and when found should lead to immediate cessation of the treatment. Even when rashes are faint, the treatment should be discontinued for at least a fortnight, as further administration of salvarsan and even of mercury is, at this stage, apt to provoke universal and most severe inflammation of the skin. When a universal rash breaks out, the treatment should be altogether discontinued, and every other anti-syphilitic treatment should at first be withheld. Before treatment is resumed in such cases the advice of a specialist should be obtained, and the greatest care should be exercised.

13. In connexion with the popular practice of combining silver salvarsan with mercury, the complications which each is apt to provoke must be remembered, and doctors are urgently advised in cases of early syphilis, with Wassermann's reaction still negative and with no general symptoms, to begin treatment with salvarsan.

14. The most rigid asepsis must be observed during the administration of all the salvarsan preparations.

15. Directions for use, sent with the various preparations, should be carefully followed, and the drug should not be dissolved in the syringe. Sterile, freshly distilled warm water, at a temperature not above that of the body, should be used, not tap-water. Sterile, distilled water sold in sealed ampoules may be used, and the solution of salvarsan should be perfectly clear, and should not contain visible particles.

16. As all the salvarsan preparations, notably neo-salvarsan and sodium salvarsan, are easily decomposed in air, becoming more toxic, it is necessary to see that no ampoule has been damaged before its contents are used. The contents of damaged ampoules, the dregs of previously opened ampoules, and preparations which have become discoloured, should not be used. Only freshly prepared solutions should be given, and it is not permissible to use ready-made solutions prepared by chemists, or to have one large stock solution for injection into one patient after another.

17. Care must be taken when an intravenous injection is given to see that the outside of the needle is not contaminated with salvarsan, that its position in a vein is such that its lining cannot be injured, and that its wall is not punctured

[2] L. W. Harrison: A Sketch of Army Medical Experience during the European War. Proceedings of the Clinical and Scientific Meeting of the B.M.A., April 8th to 11th, 1919. THE LANCET, 1919, i., 713.

during the injection, which should proceed slowly. On a complaint of the slightest pain or on the slightest sign of local infiltration or of respiratory disturbances, the injection should at once be discontinued. It should also be discontinued when there is any obstruction to the free flow of the solution, and it should not be renewed till aspiration of blood into the syringe has shown that the needle is in the proper position.

The document concludes with the general recommendation, emphasised by italics, that salvarsan treatment should be undertaken only by the doctor who has completely mastered the technique, and who conscientiously takes the above-mentioned precautions.

TUBERCULOSIS.

Influenzal Pneumonia and Pulmonary Tuberculosis.

Prof. Maurice Fishberg's oft-repeated dictum that influenza and influenzal pneumonia do not engender pulmonary tuberculosis has been so vigorously attacked by various authorities in the U.S.A., that it is interesting to find important evidence, confirmatory of his opinion, published in this country. Tucked away with uncommon modesty in the middle of an annual report,[1] there is a short note by Dr. W. H. Dickinson, tuberculosis officer for Newcastle-upon-Tyne, on the subsequent fate of persons suffering from influenzal and other forms of pneumonia. He found that during 1919 there were 297 notifications of lobar pneumonia, 269 of pneumonia associated with influenza, and 38 of pneumonia following other diseases such as measles. Many of these patients had died of the pneumonia or could not be traced, but 204 lobar pneumonias, 163 post-influenzal pneumonias, and 27 other pneumonias were investigated. They were found to have left a great aftermath of ill-health, most noticeable in the case of influenzal pneumonia, but only six patients had subsequently developed pulmonary tuberculosis. On the other hand, 42 of the 274 new sputum-positive cases registered between June 1st, 1918, and June 30th, 1920, had a record of an attack of influenza as the starting-point of the illness. How, Dr. Dickinson asks, can these two observations be reconciled? Either influenzal pneumonia does not activate pulmonary tuberculosis or, if it does, a very large number of post-pneumonic cases of pulmonary tuberculosis evade notification. The most plausible answer is probably to be found in the observation that many cases of tubercle of the lung begin very acutely with symptoms resembling those of influenza, and these are the cases which get labelled post-influenzal. In this connexion a passage in the 1919 edition of Fishberg's "Pulmonary Tuberculosis" may be quoted. "Moreover, I have not seen a single case of tuberculosis which has apparently been engendered by influenza, though many patients have consulted me along these lines."

Parallelism of Children's Rate of Growth and Tuberculosis Morbidity.

Two papers, recently published independently of each other, have thrown convergent light on the problem of tuberculosis at school age. At a Danish sanatorium for children, Dr. I. C. Rahbek[2] has investigated the heights and weights of about 500 children who were definitely tuberculous, but not in the third stage of pulmonary tuberculosis. He found that the average height of the tuberculous child is about 2 per cent. above the standard height. He considers that abnormal height and rate of growth promote tuberculosis, and that there is little evidence to support the alternative view—that tuberculosis in some mysterious manner promotes growth. He found a striking parallelism between the rate of growth at different ages and the tuberculosis morbidity rate at the same ages. Between the ages 7 and 14 girls gained 33·6 per cent. of their height since birth, as compared with only 28·5 per cent. in the case of boys within the same age limit. And the tuberculosis morbidity of girls being considerably greater than that of boys at this age, he thinks it highly probable that the more rapid growth of girls at this age is responsible for most if not all the difference in the tuberculosis morbidity of the two sexes. This explanation is the more plausible as, within the same sex, the tuberculosis morbidity runs parallel with the rate of growth from year to year. In the other paper just referred to, Dr. T. Frölich[3] points out that, during the months of May, June, and July, children grow very rapidly in height and more or less to the exclusion of other lines of development. Yet in these critical months of lowered resistance the child's physiological resources are artificially drained by the demands of the school and the impending summer examinations. When the child is released from school towards the end of July the best of the summer has gone. Not long ago in England the summer holidays started on the first of June, and lasted a couple of months.

Injurious Effects of Krysolgan in Pulmonary Tuberculosis.

The tide seems to be turning in the flow of eulogic papers on the gold salt krysolgan, introduced by Spiess and Feld. Dr. L. Rickmann[4] has tested it in 52 cases of pulmonary tuberculosis, and has encountered a number of serious complications, such as albuminuria, acute hæmorrhagic nephritis, rises of temperature, general lassitude, headache, giddiness and faintness, violent and persistent diarrhœa, and a severe universal rash reminiscent of that of salvarsan. This comparison with salvarsan reminds one that the path of even the most successful chemotherapy may be strewed with alarming incidents, but while salvarsan usually achieves remarkable therapeutic effects, krysolgan seems to have few compensatory virtues. Dr. Rickmann does, indeed, think it may be beneficial in tuberculosis of the larynx, and for this reason alone is disinclined to discard krysolgan bag and baggage. But as his results in the case of tuberculosis of the lungs were none too good, and as the disease in both lungs and larynx is one and the same, it is difficult to see how such discrimination can be justified.

Sterilisation of Tuberculous Sputum.

Two recent papers on the sterilisation of tuberculous sputum show how extraordinarily difficult this apparently simple task really is. Dr. J. Schuster[5] has done much to improve the technique of sterilisation by unslaked lime, but the objections to this process are fairly obvious. Far more promising are the investigations made by Prof. Paul Uhlenhuth,[6] who believes that he has at last solved this problem. For the past 15 years he has been working on it with his assistants Xylander, Messerschmidt, and Citron, and in testing the disinfectant action of various drugs on tuberculous sputum they have used more than 1000 guinea-pigs. Much of Prof. Uhlenhuth's paper deals with the uselessness of many antiseptics, such as lysoform and perchloride of mercury, which merely coagulate sputum, the tubercle bacilli within being completely protected by the coagulum from the further action of the antiseptic. Antiformin does, indeed, possess the merit of completely dissolving lumps of sputum and destroying adventitious germs, but it leaves the tubercle bacillus intact unless the solution is warmed to 55°–60° C. And a disinfectant which requires heating to develop its disinfectant action is of little value for practical purposes. A combination of 20 per cent. antiformin, with 10 per cent. chemically pure chlorinated lime, destroyed tubercle bacilli in the sputum within two hours, but commercial chlorinated lime proved comparatively inert, and this procedure had to be abandoned as

[1] Report of the Tuberculosis Officer for the City and County of Newcastle-upon-Tyne, 1920.
[2] Ugeskrift for Læger, Jan. 12th, 1922.
[3] Tidsskrift for den Norske Lægeforening, Dec. 1st, 1921.
[4] Zeitschrift f. Tuberkulose, 1921, Bd. 33, Hft. 4.
[5] Zeitschrift f. Tuberkulose, 1922, Bd. xxxv, Heft 5.
[6] Ibid., 1921, Bd. xxxiv., Heft 7.

being too expensive for practical purposes. In 1919 Prof. Uhlenhuth and Dr. Joetten experimented with certain alkaline compounds of cresol, which contained no soap and a small quantity of NaOH, and they found, to their surprise, that these compounds rapidly killed tubercle bacilli in the sputum. The alkali in the compound helps to dissolve the sputum, but free NaOH, even in a 20 per cent. solution, does not readily destroy tubercle bacilli, and the disinfectant action of the compound must evidently depend on some other factor. A 5 per cent. solution of alkaline lysol, containing 4 per cent. alkali and 65 per cent. cresol, was found to destroy tubercle bacilli in sputum within four hours when 100 c.cm. of this dilution were added to 50 c.cm. of sputum. When this solution was heated to 80° C., tubercle bacilli in sputum were destroyed in half an hour. In conjunction with manufacturing chemists, Prof. Uhlenhuth has tested various other compounds, the action of which depends on the association of an alkali with lysol or some other drug of the same group, and he concludes: "Das Problem der Sputumdesinfektion ist also nach unseren Versuchen als gelöst zu betrachten."

Bacterial Stains in the Treatment of Empyema.

In the U.S.A. several papers have lately been published, reviving the treatment of pyo- and pyopneumothorax by the irrigation of the pleural cavity with various bacterial stains. The idea is not new; in 1899 Lewis injected methylene-blue into the pleural cavity of patients suffering from serous effusions, and though he injected as much as 12 grains, no untoward results occurred. But it is only of late that this line of treatment has been put on a rational basis. Lewis and De Witt have shown that methylene-blue inhibits the growth of tubercle bacilli in solutions of 1 in 1000, and De Witt has found that moderate concentrations of methylene-blue will kill tubercle bacilli in vivo as well as in vitro. Churchman has reported good results from the irrigation of septic joints by a solution of gentian violet, and Waters has used this stain with good effect in cases of pyogenic infection complicating an artificial pneumothorax. One of the most recent papers on this subject is by Dr. J. Rosenblatt, and Dr. B. P. Stivelman,[1] who have injected 2 to 3 c.cm. of a saturated alcoholic solution of methylene-blue into the pleural cavities of two patients suffering from tuberculous pyopneumothorax. The results in both cases were excellent and prompt. Unlike most antiseptics, methylene-blue has a low toxicity, and it causes little pleural irritation. The fact that the urine is stained for at least 10 days after an injection suggests that it is very slowly absorbed from the pleural cavity.

NOTES FROM INDIA.

(FROM OUR OWN CORRESPONDENTS.)

Sanitary Commissioner's Report.

THE report for 1919 of the Sanitary Commissioners with the Government of India is a weighty volume. The writer has much ground to cover and is bound, under his orders, to deal with certain subjects each year, consequently he has not much room for what may be termed the more interesting side of public health progress in India. For this reason the reports resemble one another so closely from year to year that even the careful student of them may fail to see material improvement in any given direction. But, for all that, steady and slow betterment is actually taking place. Collateral evidence of this appears in two places: First, in the list of public works carried out each year, included in the provincial annual sanitary reports; and secondly, in the research work recorded in the *Indian Journal of Medical Research*. Reference to either of these will show sound progress, both in drainage and water-supply and as regards research into the many problems facing the sanitarian in the tropics. But a report dealing with 350 millions of people, the majority of whom live under rural conditions in small villages, cannot reasonably be expected to show spectacular improvement in vital statistics.

Plague at Rawalpindi.

Dr. A. R. Mehta's report to the Municipal Committee of Rawalpindi on the recrudescence of plague in that city, in October and November last, makes interesting reading. The story is as follows. Rawalpindi has always been a centre from which it is extremely difficult to banish plague infection. There is an old, more or less dilapidated grain bazaar, highly rat-ridden and constantly re-infected by grain from neighbouring villages. Last year a rather severe outbreak of plague occurred, and Dr. Mehta, who had only recently taken up his appointment, started a campaign which comprised inoculating the inhabitants, killing rats, and fumigating houses, along with propaganda advocating evacuation of infected premises and the breeding of cats. Many consider that Dr. Mehta would have been well advised to have concentrated the whole of his attention on inoculation. The experience of the last decade has shown that it is little use attempting to kill rats during the epizoötic. The disease itself reduces the rat population, and as the food-supply for the remainder is plentiful they usually avoid baits. Nothing gives so much annoyance to an Indian population as disinfecting and fumigating their houses; the procedure is costly, and it is, moreover, of doubful value from the point of view of plague, for when a case is discovered in any house the damage is already done, the fleas that infected the patient are either dead or free from infection. The real solution of the plague problem in Rawalpindi lies in pulling down the old grain bazaar and erecting a modern one which is rat-proof. Until this can be done, the best palliative measure is widespread inoculation when an outbreak threatens. Not much confidence can be placed on the keeping of cats in India; it has been tried in several places and found to fail. Either the cats find a plentiful food-supply without catching rats, or they establish a sort of friendly tolerance with the rats which leads to both living happily together.

Lady Reading's Women of India Fund.

This new Fund has been instituted in the hope of promoting a wider distribution of skilled medical aid for the poorest class of Indian woman or child. It is hoped to give assistance to the Hardinge Medical College for Women, which has done admirable work in the training of women students. The original estimates proved inadequate under the changed conditions due to the war, and though the College itself was finished in 1916, much still remains to be done for its improvement. It was only found possible to build half the proposed hospital, and in consequence the number of beds is insufficient to secure affiliation to the Punjab University as a teaching hospital. The creation of a hill hospital is also contemplated by the promoters of the Fund, since the hot weather in the plains is such a handicap to convalescents. No such hospital exists at present for Indian women. The third object of the Fund will be to establish an All-India Nursing Association for Indians on the same lines as the Lady Minto Association, which works chiefly amongst the Europeans in India. Lady Hardinge's Hospital and Lady Reading's Hospital for Children will be centres where Indian nurses will be trained, and it is proposed that branches be developed all over India, where Indian nurses will be located conveniently for the needs of the Indian female population.

The Sanitary Commissioner with the Government of Mysore announces that there has been an outbreak of relapsing fever in Kolar and Malur Taluks.

The Patna Municipal Board decided that all liquor and toddy shops will be removed from the municipal area within the earliest possible time with a view to improving the sanitation of the city and the health of its citizens.

[1] American Review of Tuberculosis, December, 1921.

MEDICAL LIFE IN A FRENCH COLONY.

BY ALFRED S. GUBB, M.D. PARIS, M.R.C.S.

CLOSE upon 20 years' experience of medical practice in Algiers suggests certain reflections which may not be found devoid of interest.

Opportunities of Practice in Algiers.

To begin with, it is a great privilege to practise in a city provided with a well-equipped university and a big general hospital; one can acquire a knowledge of cases and conditions often absent in private work. During the winter the incursion of British and American sun-worshippers brings a practice of humdrum variety, including the sort of ailments one expects to find among well-to-do travellers who live too well and take too little exercise. But in the summer, when Mustapha Supérieur is empty of its foreign visitors—when indeed the last of the better-class French families have betaken themselves to this or that watering-place in the Pyrenees or Vosges, to Aix-les-Bains or Vichy, Contrexéville or Ax-les-Thermes—then one enjoys ample leisure, pleasant except for the occasionally pronounced heat; the practitioner can revel in hospital experience and play once again at being a first-year student—for here even first-year students "walk the hospitals" and are invited, nay compelled, to familiarise themselves with the outward aspects of disease; they even administer anæsthetics when no better-qualified anæsthetist is available. For medical education the practical French system has much to recommend it; students have to give intravenous injections and perform lumbar puncture, an examination in anatomy means a practical examination in actual dissecting, and an examination in surgery postulates a real operation on the cadaver in lieu of tiresome written descriptions and vain gestures with a wooden spatula which prevail in university circles in Great Britain.

Various Unusual Cases.

Strolling through the hospital one day last summer I saw my first case of hydrophobia. The patient, who had just been admitted, had sustained a dog-bite involving the left little finger on August 2nd. He underwent the complete course of treatment at the local Pasteur Institute, and all had gone well until Sept. 4th, when he began to feel unwell and developed weakness, culminating in paralysis, of the left arm, with profuse salivation, sub-delirium, and inability to swallow. He died on Sept. 8th, and a few minutes after he had expired came four other persons who had been bitten on the same day by the same dog to inquire how he was getting on. They were naturally greatly depressed by the news. I may add that rabies is rather common in Algeria and strict precautions are enjoined, if not enforced, in respect of the canine population of urban districts.

But that was not my only "find." A patient who had been sent in with the diagnosis of *embarras gastrique fébrile* (a euphemism for typhoid) was also discovered to have enlarged lymphatic glands in the groin and elsewhere. Rapid examination of a blood smear at once revealed the presence of the cocco-bacillus. The patient was promptly transferred to the isolation hospital—where, I have heard it said, people die, never of the disease for which they are admitted, but invariably of some other complaint contracted *in loco*—but in this instance at any rate the man succumbed to bubonic plague, which was diagnosed.

The next morning I assisted at the initial steps of a hæmoculture in a case suspected to be Malta fever; hæmoculture seems to be the only way to arrive at a trustworthy diagnosis, the agglutination test being very unreliable. I have had two cases among my private patients in which recovery followed series of injections with a vaccine prepared by the Pasteur Institute. I usually resort to hæmoculture in suspected typhoid, because it enables me to arrive at a firm conclusion some days earlier than the agglutination test.

Skin Diseases.

In the out-patient department I saw two cases of "elephantiase grecque," alias leprosy, both mild forms. These cases are treated by means of colloid chaulmoogra oil (collobiase) with apparently beneficial results. At the skin clinic one sees a lot of interesting cases, though it must be conceded that 80 per cent. at least of the applicants for advice are suffering from what they call *la gale bedouine*—why "bedouine" I know not, since it differs in no essential respect from common or urban itch. As for the various forms of parasitic infection of the scalp: ordinary ringworm, favus, alopecia areata, and so on, their name is legion, especially among the natives, owing to their habit of wearing a dirty chechia[1] 18 out of the 24 hours, and to their general lack of personal cleanliness.

Syphilis.

Many cases of syphilis at all stages and in all forms are to be found, affording ample opportunity to the hunter of treponemes, the favourite method being Tribondeau's (nitrate of silver and tannin), which has the merit of ease and facility. An occasional Oriental sore (bouton de Biskra) relieves the monotonous succession of the gonococcus and Ducrey's bacillus (soft chancre). Bubos in connexion with soft chancre are invariably treated by puncture, expression, and the injection of iodoform vaseline (10 to 15 per cent.) with almost uniformly successful results; the cure is virtually immediate. It is interesting to note that the Wassermann reaction is now so well known, even to the natives, that they often come to ask for "the blood test" in diseases standing in no relationship to syphilis.

Malaria.

In the summer months the principal pathological entertainment is provided by cases of malaria. The kind varies according to the season, and period of the season. Early, the *tierce bénigne* predominates, but later on there is a majority of *tierce maligne*, with a sprinkling of *fièvre quarte*. Cases of pernicious fever are a source of astonishment to the inexperienced practitioner in the course of his first summer in Algiers. He is apt to be called to a patient, of any age, who is obviously very ill, presenting, it may be, a moderate degree of fever and some headache, or he may be drowsy or actually comatose. Unsuspicious of malaria, he is at a loss to interpret the symptoms, and while he is trying to find some plausible explanation—possibly awaiting the result of a bacteriological examination of a blood-smear—his patient expires. After one or two such experiences, of course, the scales fall from his eyes, and in future, during the summer months, he views every febrile case through malarial spectacles. When in doubt he employs quinine en masse without waiting for a scientific diagnosis. Should it turn out to be something other than malaria, two or three grammes of quinine will have done no harm, while in many instances it may be the means of saving the case.

One soon acquires the knack of determining the particular variety of parasite at a glance, though for that matter the identification is possessed of merely scientific interest, having no bearing on treatment though it may have some on prognosis. Staining specimens calls for a little *tour de main*, and even in skilled hands is not always all that could be desired. Then, too, the search is apt to tax one's patience. Unfortunately, negative cases take up most time, and even so a negative result does not peremptorily rule malaria out of court. Just as in syphilitic or gouty subjects one must always bear in mind the possible pathogenic influence of the diathesis in visceral affections supervening at a later date, so in subjects with a history of malaria we have to consider the advisability of associating quinine with such other symptomatic treatment as may appear appropriate.

[1] The cap worn by the Zouaves and Tirailleurs algériens, &c.

It takes some years to become accustomed to treatment of diseases other than malaria in malarial countries.

In years gone by practically all the cases of malaria that crowded the wards at the Civil Hospital came from outside, from the alluvial plain of the Mitidja or from the more distant south. This year, however, a very large number of cases originated in Algiers itself, an unwelcome circumstance which we attribute to the presence in the city of large numbers of infected soldiers back from the East.

The Services.

ROYAL ARMY MEDICAL COLLEGE.

Maj. and Bt. Lt.-Col. J. A. Anderson, R.A.M.C., to be Professor, vice Lt.-Col. and Bt. Col. P. S. Lelean, C.B., C.M.G., R.A.M.C.

Maj. C. Ryles, R.A.M.C., to be Assistant Professor, vice Maj. and Bt. Lt.-Col. J. A. Anderson, R.A.M.C.

Capt. R. F. Wilkinson, late R.A.M.C., to be A.D.C. to the Gov.-Gen. and C.-in-C. of the Union of S. Afr. and High Commissioner for S. Afr.

ROYAL ARMY MEDICAL CORPS.

Maj. J. W. Houston to be temp. Lt.-Col. whilst empld. as Asst. Dir. of Pathology.

Maj. W. W. Browne to be temp. Lt.-Col. whilst empld. as Asst. Dir. of Hygiene.

Capt. J. T. Simson to be Maj., and to remain secd.

Temp. Lt. B. Fitz-J. Haythornthwaite to be temp. Capt.

Temp. Maj. W. L. Cowardin relinquishes his commn. and retains the rank of Maj.

Capt. J. S. Sloper retires receiving a gratuity.

ARMY DENTAL CORPS.

Lt. (temp. Capt.) C. V. Walker to be Capt.

SPECIAL RESERVE OF OFFICERS.

Capt. E. S. B. Hamilton to be Maj.

TERRITORIAL ARMY.

The undermentioned vacate the appt. of Hon. Col. of the Divisions mentioned: Hon. Col. (Lt.-Gen., ret. pay) Sir A. Keogh, G.C.B., G.C.V.O. (2nd Lond. Divn.), Hon. Col. T. R. Glynn (W. Lancs. Divn.), Hon. Col. (Col. T.F. Res.) de B. Birch, C.B., V.D. (W. Rid. Divn.), Hon. Col. Sir J. Williams, Bt., G.C.V.O. (Welsh Divn.), Hon. Col. Sir T. C. Allbutt, K.C.B., F.R.S. (E. Angl. Divn.).

The undermentioned to be Hon. Cols.: Hon. Maj.-Gen. Sir B. G. A. Moynihan, Knt., K.C.M.G., C.B., from T.A. Res. (W. Rid. Divn.), Hon. Maj.-Gen. Sir A. A. Bowlby, K.C.B., K.C.M.G., K.C.V.O. (S. Mid. Divn.), Col. J. A. Jones, V.D., K.H.S. (Welsh Divn.), Col. J. Griffiths, C.M.G., T.D. (from 1st E. Genl. Hosp., E. Angl. Divn.), Col. J. V. W. Rutherford, V.D. (from T.A. Res., North'n Divn.), Lt.-Col. A. Thorne, V.D. (2nd Lond. Divn.), Lt.-Col. F. J. Knowles, T.D. (W. Lancs. Divn.), Lt.-Col. Sir W. R. Smith, T.D. (from Sanitary Service, H. Counties Divn.).

Col. J. F. Haswell, C.I.E., T.D. (Hon. Lt. in Army), having attained the age limit, is retired and retains the rank of Col., with permission to wear the prescribed uniform.

Officers relinquishing their commns. and retaining their rank except where otherwise stated: Lt.-Cols. H. C. Donald and J. R. Harper, with permission to wear the prescribed uniform. Majs. A. Innes and J. Walker. Capts. (Bt. Maj.) W. R. Bristow (granted the rank of Maj.), (Bt. Maj.) H. Sharpe, B. Hughes (granted the rank of Maj.), J. H. Crane (granted the rank of Maj.); H. Drummond (granted the rank of Maj.), A. N. Worsley, R. E. T. Tatlow (granted the rank of Maj.), L. S. Willox, C. Mearns, H. F. L. Hugo, A. Hamilton, G. H. H. Manfield (granted the rank of Maj.), A. C. Ainsley, H. Paterson (granted the rank of Maj.), J. A. Thomson, A. C. Haddow, L. W. Sparrow, J. F. Edmiston (granted the rank of Maj.), G. Crawshaw, and F. C. Nichols. Majs. G. Potts, F. K. Smith, and M. H. Barton; Capts. F. Clayton (granted rank of Major), W. R. Collingridge, K. H. Gill, C. B. Hawthorne, A. H. Bell, L. E. Hughes, W. E. Fitzgerald, T. Higson, W. K. Churchhouse, T. S. Stafford, E. N. Threlfall, and Van Someren.

Surg.-Maj. R. M. McQueen (City of London) relinquishes his commn. and retains his rank with permission to wear the prescribed uniform.

Sanitary Service.—Maj. (Bt. Lt.-Col.) H. F. Horne relinquishes his commn., retains his rank, and is permitted to wear the prescribed uniform.

TERRITORIAL FORCE RESERVE.

Maj. E. Gray, having attained the age limit, is retired and retains the rank of Maj., with permission to wear the prescribed uniform.

Capts. W. Bain and I. D. Stubbs relinquish their commns., and retain the rank of Capt.

ROYAL AIR FORCE.

T. L. P. Harries is granted a short service commission as a Flight Lt.

Flight Lt. W. G. Weston and Flying Officer T. A. G. Hudson are granted temporary commns. in the ranks stated.

Capt. H. H. Mallet, Army Dental Corps, is granted a temporary commission as a Flight Lt. while attached for duty with the R.A.F.

INDIA AND THE INDIAN MEDICAL SERVICE.

Lt.-Col. R. A. Needham will be associated with Dr. Norman Walker in the inquiry into the question of midwifery training in medical colleges in India.—Dr. Norman Walker is visiting India on behalf of the General Medical Council.—Lt.-Col. I. J. M. Deas has been appointed to hold visiting medical charge of the Eastern Rajputana States Agency, in addition to his duties as Agency Surgeon, Kotah and Jhalawar.—Maj. L. H. L. Mackenzie will officiate as Agency Surgeon, Gilgit.—The services of Maj. J. C. G. Kunhardt have been temporarily placed at the disposal of the Burma Government.—Maj. A. W. Harvey, Officer Commanding Marine Lines War Hospital, Bombay, has been appointed to be a Justice of the Peace within the limits of the town of Bombay.—Maj. E. S. Phipson, health officer, Simla, has been placed on special duty with the Government of India, to assist Maj. G. G. Jolly in connexion with the medical arrangements for the camps of H.R.H. the Prince of Wales.—Maj. (actg. Lt.-Col.) R. E. Flowerdew and Capt. (actg. Maj.) J. Rodger relinquish their actg. rank on ceasing to be employed as Registrars of General Hospitals in India.

DEATHS IN THE SERVICES.

Major-General W. H. B. Robinson, C.B., I.M.S., whose death on Feb. 7th is announced from Calcutta, in his fifty-ninth year, received his first commission in 1886 and saw service in the Burmese Expedition of 1885–1889 (mentioned in despatches, medal and two clasps), in the Waziristan Expedition 1894–1895 (clasp), and with the relief force in Chitral in 1895 (medal and clasp). He was also at Tirah in 1897–1898 and took part in the operations in the Bara Valley (two clasps). At intervals during his Indian service he was residency surgeon at Rajputana and at various central Indian States. In the recent war he was employed with the Indian Expeditionary Force in France (twice mentioned in despatches and awarded the C.B.). In 1919 he was appointed honorary surgeon to the King. Major-General Robinson's recent services also included those of Sanitary Commissioner of the Central Provinces, Surgeon-General in Bengal, and Acting Director-General of the Indian Medical Service.

ABERDEEN ROYAL INFIRMARY: ANNUAL REPORT.—The annual report of the Aberdeen Royal Infirmary states that 3802 cases were treated during the year 1921. Of these 955 were medical and 2847 were surgical. In the out-patient department 15,246 cases were seen. The average number of beds in daily occupation was 249, and the average length of stay in hospital was 25 days. There were 2370 operations performed on in-patients, 102 more than in the preceding year. The death-rate in cases treated was about 8·4, but if 88 deaths which occurred within 48 hours of admission are deducted, the rate is reduced to about 6 per cent., as against 7 per cent. in 1920. Forty-seven discharged disabled soldiers were treated during the year. In all 398 discharged disabled soldiers have been treated in the infirmary. The financial position is distinctly better than it was in 1920, though there is still a deficit of £741 on the year's working. Last year the deficit was £1672. While the income from parish collections, donations, and patients' payments has decreased, that from church collections, employees' contributions, entertainments, and invested property income has increased. The average cost per occupied bed—based upon the total ordinary expenditure, less the cost of out-patients (reckoned at 2*s.* each)—was £124 5*s.* 2*d.*, as compared with £126 3*s.* 6*d.* last year, and the average cost of each in-patient was £8 2*s.* 9*d.*, as against £8 17*s.* 5*d.* last year. Through the generosity of the Aberdeen University Court the infirmary has received an electrocardiograph, and a further addition to the equipment of the institution will be a quantity of radium to be lent by the Medical Research Council. A grant of £4620 from H.R.H. the Prince of Wales's National Relief Fund has enabled the Board to carry out the renewal of the electrical lighting installation, and some interior painting.

Correspondence.

"Audi alteram partem."

PARLIAMENTARY REPRESENTATION OF MEDICINE.

To the Editor of THE LANCET.

SIR,—The representation of medicine in Parliament is accidental, but the profession is rather over- than under-represented numerically. Medical men in Parliament sitting for ordinary constituencies can do very little to press the claims of medicine, or even of health, on the attention of the House, as they are naturally under the shadow of a sectional interest. Moreover, the present medical group is an accident which is not likely to be repeated in future Parliaments, since medical men belonging to different parties will be almost certainly returned. As we all know, expert witnesses give the most powerful of evidence if it is all on one side, and the weakest of evidence if it conflicts. This conflict will certainly be manifest in future Parliaments, as one can imagine if one considers the views of a Socialist and an Individualist doctor respectively on the future of the hospitals.

The essential point in medical representation in the House is that owing to the three-seat proportional representation constituency of the Scottish Universities the doctors have practically a pocket borough there. It is of the utmost importance that this Member should be fitted in every way to voice the views of the profession, because it is on him that the responsibility must and should rightly fall. It is on the selection of an ideal representative for this constituency that medical attention should concentrate; nor do I believe that an increase of doctors in ordinary constituencies will specially strengthen public health affairs in the eye of the public in the years to come.

I am, Sir, yours faithfully,
WALTER ELLIOT.

House of Commons, Feb. 15th, 1922.

VENEREAL DISEASE PREVENTION: THE TWO CAMPS.

To the Editor of THE LANCET.

SIR,—After less than two and a half years it is clear that the trend of public opinion towards the policy of the Society for the Prevention of Venereal Disease is very certain, and nothing is more encouraging than the gradually increasing strength in the National Council itself of the moderate section, who are not in sympathy with the clear and definite opposition to immediate self-disinfection, so emphatically and repeatedly stated in the early publications of the National Council.

It appears almost certain that before very long the present disunion will be ended. Evidence of the turn of the tide in the National Council is clearly to be found in an excellent book recently published by Mr. Ernest Clarkson entitled "The Venereal Clinic." Mr. Clarkson, as a member of the Executive and Medical Committees, and late hon. medical secretary of the National Council for Combating Venereal Diseases, must be an influential member of that body, and his opinion can be taken as representing the moderate section. Mr. Clarkson, in referring to the origin of the National Council, says that "the Council as a body refused to recommend the adoption of any such methods (of personal prophylactic measures)" and continues: "This led to a secession of certain prominent medical men, and to the formation of the Society for the Prevention of Venereal Disease." He goes on to say that "there is not the slightest doubt that, in many instances, an excessive stress has been placed upon the factor of fear." Further, on p. 361, he says: "We are bound to confess that if certain pre- and post-cautionary measures be taken, it is most unlikely that any evil effects will accrue." In referring to the influence of religious, ethical, and educational factors, Mr. Clarkson says: "We must, however, realise that their effect will not be evident for a long time, and it is our duty to consider what other factors may be employed in order to reduce the amount of disease in the present generation, and to secure, as far as possible, an untainted heritage for the next. Promiscuous intercourse is rampant now, and will be for many years to come. It will persist uninfluenced to any great extent by the religious or any of the other factors which have been considered. Such measures will have a greater influence upon the children and adolescents rather than upon the adults of the present day." This last paragraph might well have come from the pen of Sir Archdall Reid, who has persistently stated his opinion that moral re-education of the adult is almost impossible. On p. 366 Mr. Clarkson gives the objections to early preventive treatment so often raised by the Society for the Prevention of Venereal Disease, and concludes with the following statement, with which my Society is in entire accord—namely, "That if an individual holds a belief that safety will be assured to him by early preventive treatment, there is not much practical difference between harbouring a belief and carrying a packet."

It is a pleasure to be able to note that Mr. Clarkson accepts our statements that we do not advocate the free distribution of packets, and says on p. 371, "The advocacy of immediate self-disinfection is in no sense synonymous with the issuing of 'packets' to the community," and he remarks that "those who oppose immediate self-disinfection on ethical grounds, should satisfy themselves as to whether the carrying of a preventive packet or materials in the pocket spells a greater temptation to the individual than his bearing in his mind the statement that early preventive treatment is stated to be more efficacious than immediate self-disinfection." On p. 374, Mr. Clarkson says: "There is another section, and undoubtedly a very large one, to whom access to an early treatment centre or to a medical man would be impossible, for these immediate self-disinfection is necessary, in the interests of the public and of the individual implicated." The section of Personal Preventive Measures on p. 374, ends with the following words: "The N.C.C.V.D. are in favour of immediate self-disinfection by means of soap and water, they are also in favour of early preventive treatment" (here occurs a footnote to the effect "The N.C.C.V.D. has now come to regard potassium permanganate with greater favour"). "The S.P.V.D. advocate immediate self-disinfection by means of other chemical substances, which in the majority of cases can be more conveniently and safely utilised. Surely there is sufficient common basis to be found in the common idea that certain procedures should be carried out by the individual."

I am, Sir, yours faithfully,
H. WANSEY BAYLY.

Harley-street, W., Feb. 17th, 1922.

CONTROL OF VENEREAL DISEASE: THE CAMPAIGN IN GERMANY.

To the Editor of THE LANCET.

SIR,—In view of Mr. Wansey Bayly's letter in your last issue, it may interest your readers to see the following letter received from Prof. E. Galewsky, who is president of the Deutsche Gesellschaft zur Bekämpfung der Geschlechtskrankheiten.

I am, Sir, yours faithfully,
SYBIL NEVILLE ROLFE.

Avenue Chambers, Southampton-row, W.C.,
Feb. 17th, 1922.

[COPY.]

DEAR MADAM,—. . . . On the whole I am fully in agreement with the views of your medical committee.

In our new draft Bill the sale of the means of self-protection is to be allowed. But any indecent sale, blatant advertisement, or anything that could be a public offence is to be criminal. I, myself, take up the position that above all

self-disinfection is not to be recommended to young people, but that we must impress only chastity upon them as the best means of protection. We wish to handle this matter if possible in such a way that these prescriptions can only be given by doctors and the "Beratungsstellen." I do not consider it right to have the advertisements of these methods of self-disinfection in any of our exhibitions or public advertisements.

At the most we should agree that printed circulars could be obtained by request at our exhibitions concerning these means of self-disinfection, and that attention should be drawn to these circulars in some way.

But this must be so arranged that no young people, for example, can obtain them.

On the other hand, I believe that in our consulting hours we doctors should and must give information to all who have been ill or who wish to have these means of self-protection, as to what they should do to protect themselves.

I also hold the view that the State, as such, should not be allowed to handle the question of self-disinfection but that this must be done privately, and as I have indicated above, in the most confidential and decency-observing manner possible.

I believe that here in Germany, we are, on the whole, fully in accord with the National Council for Combating Venereal Diseases, and I should be very pleased to hear from you that you agree with my views. At the same time let me thank you for your *Health and Empire* journal, which has interested me very much. I hope shortly to send you a small contribution from my pen on the new laws we are drawing up on the combating of sexual diseases.

Believe me, yours sincerely,

Dresden, Jan. 13th, 1922. (Signed) E. GALEWSKY.

KALA-AZAR AND THE BED BUG.

To the Editor of THE LANCET.

SIR,—The announcement in the *Indian Journal of Medical Research* for January, 1922, of a telegram, received from Mrs. Adie, stating that she has found a swarming infection of Leishman-Donovan bodies in the salivary glands and ducts of *Cimex rotundatus* caught in the bed of a suspected kala-azar case, and that this discovery positively proves that the bed bug is capable of transmitting the disease through biting, raises once again the whole question of the transmission of this disease. In the light of the announcement it may be well to review the various investigations which led to the bed bug being accused of transmitting kala-azar, and to weigh the evidence which has been adduced in favour of this hypothesis, for, however probable it may be, it must always remain a hypothesis till the actual transmission experiments have been carried out. The announcement, to which you drew attention in an annotation in THE LANCET of Feb. 11th, may lead to the hasty conclusion that the method of transmission of the disease by the bed bug has at last been solved.

When kala-azar first became known as a distinct disease in India, after the investigations of Leishman, Donovan, Rogers, and others, attention was turned to the discovery of a vector. It was realised that kala-azar was a house disease and Rogers and many others considered the bed bug as a possible agent. This elusive insect is admirably suited to play a part in the spread of infections. It does not live on its host but sucks his blood at night, returning in the daytime to any shelter it may find. It ingests a large quantity of blood on which it may survive for long periods without further feeding. Every time it feeds, it may do so on a different individual, while it is easily transported from place to place in bedding or furniture. In spite of these facts, though the bug has been accused of carrying many diseases, it has never been proved to carry any one of them.

That the bug was suspected as being the carrier of kala-azar was only natural, but against this view is the very strong argument that the disease in India is peculiarly limited in distribution, while the bed bug occurs everywhere. In order to obtain more definite evidence Patton turned his attention to the behaviour of the Leishman-Donovan body in the bug. He demonstrated the presence of Leishman-Donovan bodies in the peripheral blood of cases of kala-azar and proved that bed bugs fed on these cases ingested parasites with the blood they imbibed. Your notice in last week's LANCET suggests that the scantiness of parasites in the peripheral blood argues against any invertebrate vector acquiring infections from this source. It has been demonstrated that cultures, which ultimately contain thousands of flagellates, can be obtained from a few drops of finger-blood, and we have no reason to suppose that the invertebrate vector, whatever it may be, may not obtain from the blood a sufficient number of parasites to lead to its infection. Patton was able to prove that the organism ingested from the peripheral blood of cases of kala-azar developed into a fully formed flagellate in the stomach of the bug, as Rogers had shown it did in the culture tube. This fact was regarded as proof that the bug was the carrier of kala-azar. It was, however, discovered by the writer that other flagellates, such as the rat trypanosome, were also able to undergo a development in the bug, and furthermore, that the parasite of oriental sore of Bagdad, a disease which is certainly not carried by the bug, also developed into flagellate stages in this insect. It was concluded, with ample justification as subsequent investigations prove, that the stomach of the bug could act merely as a culture tube on account of the large quantity of slowly digesting blood it contained and that the mere fact that the Leishman-Donovan body became a flagellate in the stomach of the bug was in itself no proof that this insect was its natural host. This conclusion has received support from experiments conducted subsequently by Patton himself. He has investigated the length of time the flagellates can persist in the bug and has proved that those developed from the Leishman-Donovan body may still be present 41 days after the parasites were first taken up. He has, however, shown that other flagellates, of which the bed bug cannot possibly be a host, such as those of the flea and house-fly, can survive in the bug for even a longer period. The mere persistence of the Leishman-Donovan body in the bug has thus taken us no further towards arriving at a final verdict.

The next step was the announcement by Mrs. Adie last year that the Leishman-Donovan body, after being taken up by the bug, actually entered the cells of the stomach and there underwent a development comparable with that which is known to take place in the case of the rat trypanosome during its development in the flea. It is unfortunate that this process was only observed in dead bugs in which the cells of the stomach must evidently be in an unnatural condition and subject to invasion by organisms in a manner which would not occur in life. Patton states that he has confirmed these observations, but here again it is not clear that the intracellular stages were observed in living bugs. Nevertheless, he claims that "this is the final proof that Cimex is the true invertebrate host of *Herpetomonas donovani*." It is maintained that the flagellate enters the cell of the stomach and there becomes the "thick-tailed" form, which was first described by Cornwall, and that this proceeds to multiply within the cell. No details of Patton's technique are known, but in the case of those made by Mrs. Adie it is far from clear from the illustrations that all the forms depicted are really Leishman-Donovan bodies, or developmental stages of these. Some of them have the appearance of parasites of a different nature entirely—possibly sporozoa—and that other parasites may be present is proved by the fact that nematode larvæ occurred in these bugs. It is useless to speculate as to how the latter gained entrance to the bugs, but it is clear that observations made on bugs which have been dead some days and which have other concurrent infections cannot be employed or must be employed with the utmost caution in making deductions as to what happens to the Leishman-Donovan body under natural conditions. From Mrs. Adie's results and his own confirmations of these, together with the fact that he has never found the least evidence of a salivary gland infection during the many years he has investigated the subject, Patton comes to the con-

clusion that the parasite is transferred to man by the bug being crushed on the skin and not by the bite of the bug.

It is difficult to judge of the significance of the intracellular stages in the bug, but one must be cautious in concluding that what occurs in dead cells is an indication of what will occur in life. Neither Mrs. Adie nor Patton has obtained evidence of the intracellular stage in living bugs, and it seems not improbable that just as the flagellates of the flea and house-fly were shown to persist in the bug as long as, or even longer than, the parasite of kala-azar, so intracellular stages would occur in the case of dead or dying cells. The observations of Mrs. Adie and Patton were made on crushed material examined fresh and in smears, a method which gives very erroneous ideas of the true relation of parasites to cells. It is highly significant that in the same number of the *Indian Journal of Medical Research*, Cornwall describes experiments he has made with bugs with the object of confirming Mrs. Adie's observations. Cornwall employed live bugs fed on cultures and the stomachs were fixed entire and sectioned without disturbing the cells. Though heavy infections of the stomach occurred, he could not obtain the slightest evidence of any intracellular stage. Furthermore, he concludes that the "thick-tailed" form first described by him and upon which Mrs. Adie and Patton lay so much stress, is merely an abnormal form and has no place in the true life-cycle of the parasite. It is clear, therefore, that there is no real evidence that an intracellular stage occurs during the development of the Leishman-Donovan body in the living bed bug and that the stages which have been found in the dead bugs may be merely a culture of the flagellate in dead or dying cells, and, as already remarked, it is not improbable that other flagellates may behave in a similar manner under like conditions. Patton's statement, therefore, that "the final proof" has been obtained seems premature.

We now come to the last stage—namely, the announcement contained in Mrs. Adie's telegram that Leishman-Donovan bodies have been found in the salivary glands of the bug. If this is correct, then Patton's carefully argued conclusion expressed in the same number of the *Journal* that infection is spread by the crushing of the bug on the skin will hardly be necessary. On Mrs. Adie's observation itself it is difficult to form an opinion from the few details which the telegram contains. In the first place, it is evident that the bug came from the bed, not of a case of kala-azar but only a suspected case, and there is no proof that the bug had even fed on this particular individual. Furthermore, it is quite clear that the statement that the parasites in the salivary glands were actually Leishman-Donovan bodies requires proof. It is notoriously difficult to identify flagellates of this kind. Those which produce kala-azar and oriental sore are often indistinguishable from purely insect flagellates which give rise to no disease and are never parasitic in vertebrates. However closely the salivary-gland forms seen by Mrs. Adie resembled the parasites of kala-azar, it is impossible that she can have obtained proof, from the single observation, that she was actually dealing with what she supposes the organism to be. It is quite possible that the bed bug may occasionally harbour a flagellate of its own, though, if this be so, Mrs. Adie is the first to discover such an infection. Flagellates resembling the Leishman-Donovan body occur in many arthropods. They are mostly parasites of the intestine but occasionally invade the body cavity, salivary glands, and other organs, while in one case a development in the cells of the stomach has been described. It is possible that Mrs. Adie was dealing with a rare infection of this kind. As an illustration of the confusion to which such an organism may give rise, we have only to remember the natural flagellate of the tsetse-fly which was frequently mistaken for developmental stages of pathogenic trypanosomes in Africa. The fact that the flea harbours a flagellate very similar to that of kala-azar has often led to the latter being regarded as the kala-azar parasite itself and to the view that Mediterranean kala-azar is transmitted by the flea.

The fact that thousands of bugs have been dissected during kala-azar investigations without a single instance of a natural flagellate of the bug being discovered may suggest that Mrs. Adie was actually observing the parasite of kala-azar. On the other hand, thousands of bugs which have taken up the parasite of kala-azar, or have had opportunity of doing so, have also been examined without evidence of salivary gland infection by the parasite being found. The single instance brought to light by Mrs. Adie is capable of either interpretation. Whether she was dealing with a harmless flagellate of the bug or a developmental stage of the Leishman-Donovan body it is evident that a salivary-gland infection is of very rare occurrence. The observation is undoubtedly a valuable one and may be very suggestive in view of the fact that the bug, as far as we know, rarely feeds on anything except human blood, but unfortunately the final proof of the nature of the flagellate is lacking and cannot be obtained till many more similar instances have been seen. If it could be demonstrated that laboratory-bred bugs which ingest Leishman-Donovan bodies from the peripheral blood of cases of kala-azar show developmental stages in the stomach and within the cells of this organ and that this is followed by an infection of the salivary gland, then there would be great presumptive evidence in favour of regarding the bug as the vector, though the final proof could only be obtained by the actual transmission of the disease. Up to the present this has not been done. That opinion in India is still undecided is borne out by the fact that in this one number of the *Indian Journal of Medical Research* we find that, as a result of the discovery of the so-called intracellular stages, Patton considers that the final proof that Cimex is the invertebrate host has been obtained, and that infection occurs through the crushing of the bug on the skin, Mrs. Adie wires that her discovery positively proves that the bed bug is capable of transmitting the disease through biting, while Cornwall suggests that it would be well to give the bed bug a rest in connexion with leishmaniasis and that some other possible vector be carefully investigated. From an epidemiological point of view there is something to be said in favour of the bed-bug hypothesis, but the wide distribution of the bug compared with that of kala-azar is against it. Patton believes that the fact that only a small percentage of bugs are able to become infected and remain so explains why the distribution of the bug does not correspond with that of kala-azar—presumably because there is only a remote chance of infected bugs being transferred from place to place. This argument seems to ignore the fact that disease is rarely spread by the transportation of infected insects, but by the movements of already infected human beings. Cases of kala-azar have constantly moved from the endemic centres in India to other places where it does not exist, and though in these bed bugs abound, the disease has never become established. This is one of the most puzzling features of kala-azar, and if the ubiquitous bug should prove to be the vector, it will be very difficult to explain why the disease is limited to special endemic foci.

We may conclude, therefore, that the bed bug, though a suspected agent, still awaits the final verdict, and that unless more tangible and convincing evidence is forthcoming the jury will certainly disagree. Every credit is due to the prosecution for their most careful and exhaustive inquiries which have extended over many years, and which have been stimulated by a desire to rid the world of a harmful parasite, but the elusive bug, which has been acquitted of so many charges, has so far escaped sentence in the case of kala-azar also.

I am, Sir, yours faithfully,

C. M. WENYON,
Feb. 12th, 1922. Wellcome Bureau of Scientific Research.

THE TREATMENT OF GASTRIC ULCER.

To the Editor of THE LANCET.

SIR,—In the recent discussion at the Royal Society of Medicine we were invited to believe that a septic focus in the appendix will cause an ulcer in the stomach or duodenum, though we were not told how it selected that remote spot in the vast intestinal tract. In all cases of septic appendix there is a mechanical cause, be it a kink, adhesion, stricture, or foreign body. Is there any evidence that the cause of gastric ulcer is of a similar nature? The intestinal flora of the constipated sheep is quite different from that of the diarrhœic cow, though the diet is the same in each case. Dr. Mutch has proved the presence of pathological bacteria in different parts of the bowel in cases of intestinal stasis. The clinical fact that in cases of gastric and duodenal ulcer there is present almost invariably severe constipation helps to strengthen the chain of evidence that intestinal stasis is the fundamental cause of this condition.

I am, Sir, yours faithfully,
HENRY MENZIES.

Ashley-gardens, S.W., Feb. 18th, 1922.

To the Editor of THE LANCET.

SIR,—Sir Arbuthnot Lane's letter in your last issue calls attention to a most important aspect of this subject—namely, the view that gastric ulcer is not in itself a clinical entity, but is an end-result, following on changes elsewhere in the alimentary tract. In the large number of his operations at which I have been privileged to assist, and in all of my own cases, there has been invariably present some degree of obstruction to the outflow of the ileum, either by a controlling appendix, or a kink, or severe colon stasis. If this view is admitted, and it is one based on demonstrable conditions, it follows, firstly, that greater attention should be paid to the prevention of ulcer by medical treatment of the antecedent conditions; and secondly, that when the ulcer is actually present surgical measures directed to its removal only, while freeing the patient from the effects of the ulcer itself, leave him with the causative factor still at work. The variety of surgical measures that have been adopted for the treatment of gastric ulcer is in itself evidence that the results leave something to be desired, and I would raise the question as to whether this something is not an adequate examination and consideration of the changes in the rest of the intestinal tract.

I am, Sir, yours faithfully,
Wimpole-street, W., Feb. 17th, 1922. E. G. SLESINGER.

LUNACY ADMINISTRATION.

To the Editor of THE LANCET.

SIR,—In case you have misunderstood the proposal I made at the recent conference on Lunacy Administration and alluded to in the article in your issue of Jan. 28th last, I enclose four abstracts from my address which make the position I took up regarding the relationship for the Area Committees of Mental Hygiene to the Board of Control quite clear:—

"Outside your hospitals there is a vast field of mental unhealthiness and decay which the public is becoming more conscious of, and thoughtful people are demanding that adequate steps should be taken to deal with it. One authority only, properly allied to general medicine, should have the handling of mental sickness."

"I claim that from the dominant position you occupy as regards experience and knowledge of the mentally afflicted, this wider field of psychiatrical medicine is your rightful heritage, and it is up to you to claim it and make good your claim by creating a thoroughly efficient mental treatment service."

"The proposal I have thought of for some time is that, for the advancement of psychiatry and the better administration of the lunacy service, the country should be divided into such areas as would be found convenient, and that for each area there should be created by the Minister of Health an advisory committee of mental hygiene composed of lay and medical members elected by each county and borough authority, having actual charge of the insane. Other members might be coöpted as operations extended, but as far as possible each county and borough mental hospital in an area should have one lay and one medical seat on the Area Committee. When it happened, for instance, in the course of these advisory committees' activities in propaganda and other work, that a special clinic was created or a ward of a general hospital allotted to mental cases, naturally representatives would be allotted seats on the committee. Their purpose should be to advise on the one hand the Ministry of Health through the Board of Control, and on the other hand the local authorities."

"What is of great importance, it would be somewhere for the Board of Control to get a larger opinion from on all those points which arise from time to time, and which are demanded by the Ministry or by public opinion."

It is not my intention that these Area Committees should supersede the Board of Control or the local authorities in any of their statutory duties. They are designed to assist and advise bodies having charge of the insane, for propaganda work, and to bring into closer sympathy and relationship the public, the mental hospitals, and those actually engaged in the care and treatment of the mentally afflicted. At present the public have barely a nodding acquaintance with the work of the mental hospitals, a serious disadvantage to both, and a disadvantage the general hospitals do not labour under. One of the particular cares of the proposed Area Committees of Mental Hygiene would also be the prophylaxis of mental disease and degeneracy, which includes such matters as industries and mental hygiene—the abuse of alcohol, venereal disease, bad housing and overcrowding, &c.—all questions profoundly affecting the incidence of mental trouble and which should be studied locally before really sound legislative action can be taken. The experience and knowledge gained by mental hospital physicians and members of the governing bodies of mental institutions of the evil environment and conditions which have been the actual cause of mental breakdown or deficiency of the patients in their institutions is at present almost entirely lost to public welfare in general, and especially to the mental hygiene of localities. The proposal I have suggested would go far to remedy this.

I am, Sir, yours faithfully,
JOHN R. LORD,
Feb. 13th, 1922. Co-Editor, *Journal of Mental Science*.

*** We had no difficulty in appreciating Dr. Lord's position, but our readers will like to see his proposal in more detail.—ED. L.

BRITISH MEDICAL PRACTITIONERS IN CHINA.

To the Editor of THE LANCET.

SIR,—I was glad to read in THE LANCET of Feb. 11th the despatch from H.M. Minister in Peking, calling particular attention to the dedication of the magnificent Union Medical College, erected and endowed by the Rockefeller Foundation. I wonder whether the young men and women now equipping themselves for their life's work in our medical schools are adequately alive to the many and varied openings for them in China! It is notorious that with most of us life's motives are complex. Associated with a certain interest in the practice of medicine and a wish to relieve the sufferings of those around us, there are a number of other considerations that influence men and women in prosecuting medical study and practice. These may be as humble as adopting a means of livelihood that lies closest to hand, and the desire to follow in a father's footsteps, or as exalted as the determination to enlarge the field of knowledge, to discover new and better means of relief of human suffering, or, better still, to inaugurate measures to prevent pestilence and disease and remove restraints upon the full development of human powers. Between these extremes are many others that will occur at once to your readers. I would only refer to love of adventure and desire to propagate Christianity.

Almost every motive—except the desire to amass a fortune or win titles and honours—may well lead British doctors to China. There has never been a fairer opportunity of sharing in the introduction of scientific knowledge into a vast virgin soil of well-endowed men and women; never such a chance of

determining the direction in which a great nation shall seek deliverance from the thraldom of ignorance and tradition. Nowhere in the world is there such a field for the best class of medical missionary as in China, and where else is there such a movement for the emancipation of woman? It is not possible to write of the new pathological problems to be solved in China, for they are not yet known, but they must be many and of great importance. Anthropology, zoology, botany offer rich fields for hobbies or collateral study. And all is to be done in a land of many and great natural beauties, among a people with a civilisation far older than any in Europe, and an unequalled reverence for their great literature and exquisite art.

Many of your readers must remember the martyrs of the Boxer rising and the effort to expel foreigners from China, yet already we have the magnificent Rockefeller Medical College at Peking, the great Christian University at Tsinanfu, the splendid institutions of Dr. and Mrs. Duncan Main at Kangchow, the unique institution of Mr. Whiteright at Tsinanfu, and many another similar good work. Readers of Miss E. G. Kemp's "Chinese Mettle" will know how urgent is the need for well-trained, sympathetic, open-minded Christian men and women to aid the Chinese in the development of what promises to be the greatest and most eventful social evolution of history. Our countrymen have ever been foremost in high adventure, and it is to be hoped that British medical men and women will take their full share in making and moulding a new China.

I am, Sir, yours faithfully,

London, Feb. 15th, 1922. ALFRED PEARCE GOULD.

ALPINE TREATMENT OF TUBERCULOSIS.

To the Editor of THE LANCET.

SIR,—I cannot agree with your correspondent, Sir Martin Conway (THE LANCET, Feb. 11th), that "the passport tyrants in all Foreign Offices and Consulates and other interferences with free international travel resulting from the war, have had a disastrous effect upon the treatment of tuberculosis." It seems difficult to say on what grounds and for what purpose he makes this sweeping and not too generous statement. The alpine resorts for the treatment of pulmonary tuberculosis are very much overrated—and also very much advertised. Egypt, the Canary Islands, and South Africa have had their day. Now it is Switzerland.

The medical profession have had an opportunity of testing the results of treatment in our "damp and sunless" climate during the last 25 years or more, and I venture to say that a good many of us are satisfied that results as satisfactory can be obtained in British sanatoriums. If Sir Martin Conway will compare the results of treatment in some of our leading sanatoriums with those of similar institutions in Switzerland, he could satisfy himself on this point. We hear about the wonderful cures from Switzerland. We hear little or nothing about the failures. Here are two of them. A medical man went to Davos in 1910, suffering from extensive tuberculosis of the lungs with raised temperature and numerous tubercle bacilli in his sputum. While there he lost weight, developed a tuberculous laryngitis, and was sent home by one of the English physicians. On arrival in England, he went into a small private sanatorium, and nine months later he was sufficiently recovered to take up a public appointment. He is to-day in perfect health, is married, and has two healthy children. Another patient had spent two winters in an English sanatorium in Davos and was sent back to die in the spring of 1911. When he reached his home in a London suburb, he built a hut in his back garden and underwent the cure there. I had a letter from him the other day and apparently he is very well now.

The Swiss climate is certainly ideal for the sun cure in surgical tuberculosis, but it is not always the ideal climate for pulmonary tuberculosis as these two cases show. Before the war, the Queen Alexandra Sanatorium and other similar institutions in Switzerland found it difficult to carry on, chiefly because few patients cared to spend the summer months there, when the climate is, if anything, worse than ours. These institutions were running at a loss because patients did *not* find it "disastrous" to spend the summer months in British sanatoriums.

The class of patient for which Sir Martin Conway is appealing would, I venture to say, do just as well under treatment in a sanatorium in this country. They do not belong to the idle rich who can afford to go to Switzerland winter after winter. Most of them have to earn their livings. For them to undergo the cure in the same climate in which they are going to live and work is preferable. I believe this is the view held by many experts in this and other countries.

I am, Sir, yours faithfully,

FELIX SAVY, M.B., Ch.B.

Grampian Sanatorium, Kingussie, Inverness-shire, Feb. 16th, 1922.

THE EDUCATION OF THE DEAF.

To the Editor of THE LANCET.

SIR,—In support of Mr. Macleod Yearsley's letter under this heading in your issue of Feb. 11th I would advance the following arguments.

1. Deaf children are now taken into the Scottish schools and institutions at the age of 5 and into the schools of the Glasgow educational authority at the age of 3. Why should an English child be handicapped by having to wait till he is 7 years old?

2. One may argue quite fairly that a hearing child from a decent home may delay his entrance to school by a year and find himself at 14 or 16 years not a bit behind, because during the year at home his education has been progressing and his mind developing, but the deaf child's mind does not begin to develop till he enters school.

As one who has worked for the deaf for over 30 years, and who has been a steady advocate for the early commencement of their education, I should deplore any step which would delay that commencement.—I am, Sir, yours faithfully,

JAMES KERR LOVE, M.D., F.R.F.P.S.G.

Glasgow, Feb. 20th, 1922.

AMAAS OR ALASTRIM?

To the Editor of THE LANCET.

SIR,—In your issue of Dec. 17th, 1921, you annotate a paper by Dr. W. G. MacCallum and Dr. L. M. Moody on Alastrim, which appeared in the *American Journal of Hygiene*. I saw a great number of such cases when surgeon-major to the Cape Mounted Rifles in 1876–77–78 during the Gaika and Galeka wars. The disease has been known and prevalent amongst the native races from time immemorial, and known as "amaas." Thousands of men, women, and children prisoners were affected, but their condition gave rise to no concern. I still meet with cases in the Kaffir kraals and Native Affairs Department. To experienced South African medical men it is easily recognised. I have never seen a case in the white race.

It is but just that Dr. de Korte should be given the credit of having made the first careful study and published a paper on Amaas, or Kaffir Milk-Pox, which appeared in your columns on May 7th, 1904. In July, 1911, Dr. Emilio Ribas, of São Paulo, Brazil, published in the *Transactions* of the Society of Tropical Medicine and Hygiene a paper entitled Alastrim, Amaas, or Milk-Pox, stating his opinion that the disease he was writing of was probably amaas as described by Dr. de Korte. Therefore, according to the rules of nomenclature, the name should be "amaas" and not "alastrim."

I am, Sir, yours faithfully,

Benoni, Transvaal, Jan. 23rd, 1922. J. FEHRSEN, M.D.

MODIFICATION OF THE LANTERN FOR LECTURES.

To the Editor of THE LANCET.

SIR,—Use of the lantern for lecture purposes in the common fashion offers several inconveniences. First, the room must be darkened, a condition that hinders note-taking, prevents demonstration of specimens, and favours somnolence; second, the windows must be closed, a great disadvantage in warm weather; third, a lantern attendant is necessary and the number of slides to be shown may be few or many; fourth, arc illumination is required. In order to overcome these and other objections, I devised and, since October last, have had in constant use, the following modifications.

The lantern is provided with a gas-filled incandescent lamp (1500 c.p., 7 t. amp.) and, instead of the usual method whereby an assistant projects the image on the wall behind the lecturer—i.e., some 15 ft. from the front row of students—in the method under description the lecturer himself operates the lantern from his bench, controlling the light by an ordinary tumbler switch. The image is projected upon and viewed through a ground-glass screen placed 3 ft. from the front row of students. Hence, the usual method in which the projection lens points towards the lecturer and a large dead-white receiving screen is situated behind him, is replaced by a method in which the projection lens points towards the audience and a small translucent screen intervenes between lecturer and audience.

As a result of its nearness to the observer, the image need not be so large for proper vision, and a ground-glass screen of which each side measures 26 in. is sufficient. But the principal point is that, owing to the sufficiency of a smaller image and its nearness to the observer, the law of inverse squares governing illumination operates at so great an advantage that the image on the screen is clearly visible in diffuse daylight or ordinary artificial illumination of the lecture theatre even in the back rows, 20 ft. from the ground-glass screen. For a lamp using 7·5 ampères special wiring is necessary, but Messrs. Fallowfield, Charing Cross-road, are supplying a complete outfit, consisting of lantern, lamp (800 c.p.) resistance, screen and stand (cost £15) that can be worked from the ordinary lighting circuit by means of an adapter. One proviso is necessary. It is impossible for the apparatus to compete with direct sunlight. The blinds must be drawn on that side of the room into which the sun's rays enter. If this be done, an observer at a distance of 30–40 ft. from the screen can see the image well, even at noon on the brightest day in October. Whether he will be able to do so in June I do not yet know.

I believe the modification is one of great practical use to teachers.—I am, Sir, yours faithfully,

W. S. LAZARUS-BARLOW.

Cancer Research Laboratories, Middlesex Hospital, Feb. 17th, 1922.

CANCER RESEARCH AT KING'S COLLEGE, LONDON.

To the Editor of THE LANCET.

SIR,—Considerable publicity has been given recently to the work of the Imperial Cancer Research Fund at the Middlesex Hospital. Among the other deserving institutions engaged in this research, not mentioned, it may be well to remind your readers of the work which is being done in the physiological and bacteriological laboratories of King's College, which has been carried out for many years by Dr. J. A. Shaw-Mackenzie, and without any financial assistance.

The generous offer of Lord Atholstan and of Sir William Veno towards cancer research work raises the question of the medical side in cancer treatment and encourages this aspect of the problem. That this aspect of the problem is justified may be gathered from the facts than cancerous tumours in the human subject may remain stationary over considerable periods of time, and that disappearance of cancerous growths occurs spontaneously in a large percentage of inoculated tumour mice. These facts seem to indicate that defensive processes of the body are at work.

In this connexion, one of the results of the laboratory investigations is that the blood-serum of recovered mice shows that natural chemical processes are at work, and that a natural and increased production of lipase and of fatty acids in the tissues are important factors in the protective mechanism. The same reactions of the serum held good in recovered tuberculosis and other bacterial diseases examined. It has been shown further that sodium oleate amongst other substances increases the action of lipase in vitro and in vivo, and beneficial results have long been reported from its use in certain cases of inoperable cancer. It is accordingly not unreasonable to hope that it is in the direction of reinforcement of natural processes advances in treatment may be made.

It was on this basis that (1) preparations of saponified extracts derived from the fatty material and lipoids of cancerous and tuberculous material have been made, and the same suggested from other pathological tissues. Further investigations are being continued on the (2) trial and therapeutic efficacy of these preparations; (3) examination of sera, including complement-fixation tests in cancer; and (4) the composition of cancerous material, with special reference to the fats and fatty acids. The work of C. C. Warden, at the University of Michigan and St. Josephs of Mercy Hospital, Ann Arbor, which is reviewed in the February number of *Medical Science*, issued by the Medical Research Council, London, appears to be on similar lines. While, however, in this work "the specific antigens of cell, bacterial and somatic," are attributed to suitably dispersed fatty acids, the importance in particular of the bacterial fatty acids and their sodium salts is evident in immune processes. I am, Sir, yours faithfully,

W. J. SIMPSON.

King's College, London, Feb. 18th, 1922.

A DISCLAIMER.

To the Editor of THE LANCET.

SIR,—I shall be greatly obliged if you will allow me the opportunity of stating in your columns that I neither have, nor ever have had, any kind of connexion whatever with the commercial preparation known as "Dimol" or any other "antiseptic" of commerce. It is not possible for me to find the leisure to reply personally to the communications and inquiries which continue to reach me from time to time (owing to an inconvenient accidental similarity between my name and another) regarding the merits or demerits of advertised antiseptics. But it seems to me undesirable to appear, by silence, to admit either the accuracy and propriety, or the relevancy to myself of opinions addressed to me by correspondents under a misapprehension. I am, Sir, yours faithfully,

E. W. AINLEY WALKER.

University College, Oxford, Feb. 16th, 1922.

RUPTURE OF THE RECTUS ABDOMINIS MUSCLE IN INFLUENZA.

To the Editor of THE LANCET.

SIR,—Two and a half years ago an account was published in THE LANCET [1] of a case of ruptured rectus abdominis muscle occurring in influenza where an operation was performed. During 1921 I saw a similar case, in which, after some discussion as to the advisability of operating, the condition was diagnosed and no operation performed. The diagnosis was confirmed by autopsy. Recently a surgical colleague told me that he had unexpectedly discovered the condition in

[1] W. Balgarnie: THE LANCET, 1919, i., 843.

the course of an operation on a patient suffering from influenza; it was frequently seen during the influenza epidemic among the troops in France in 1918.

I have been surprised to find how long ago this condition was recognised; and perhaps the reference I have found is not by any means the earliest recorded. Lieutaud in his Historia Anatomico Medica (Vol. II., p. 329, Paris, 1767) quotes the case of a man, aged 30, who was seized with epidemic fever and died on the eighth day. Both recti abdominis were found ruptured. The appearances resembled those of rupture of the sterno-mastoid muscle seen in death by judicial hanging.

I am, Sir, yours faithfully,

Clifton, Bristol, Feb. 10th, 1922. J. A. NIXON.

GERMAN X RAY APPARATUS.

To the Editor of THE LANCET.

SIR,—A brief study of the contributions which have recently appeared in your pages discloses the unpleasant fact that the medical profession are already patronising German manufacturers by purchasing X ray and electro-medical apparatus of German origin, in particular equipments for deep therapy treatment.

As equally good, if not superior, apparatus is manufactured in this country, there is no excuse for purchasing these appliances from our late enemies. There are nearly 2,000,000 unemployed in this country, and it is therefore everyone's duty to assist in stimulating home industries rather than those of Germany; we wonder whether those who place their orders abroad appreciate the inevitable result of their action.

If adequate support is not forthcoming for the British manufacturer, he obviously cannot continue, and will gradually cease, to construct British X ray and electro-medical apparatus, and seek the easier and possibly more remunerative path of representing a foreign house and so satisfy the demands of the English medical profession.

I am, Sir, yours faithfully,

A MANUFACTURER OF BRITISH APPARATUS.

London, Feb. 14th, 1922.

Parliamentary Intelligence.

HOUSE OF COMMONS.

TUESDAY, FEB. 14TH.

Removal of the Shepherd's Bush Orthopædic Hospital.

Sir MATTHEW WILSON asked the Minister of Pensions whether the hospital at Shepherd's Bush, which has been specially equipped for orthopædic surgical treatment, was to be transferred to the South African Hutment Hospital at Richmond; and, if so, why.—Mr. MACPHERSON replied: The answer is in the affirmative. I received urgent representations from the guardians of the parish of Hammersmith to the effect that the administration of relief in the parish was seriously hampered by my continued occupation of this institution, which was formerly the workhouse and infirmary of the parish, and the guardians were only willing to assent to an extension of the tenancy of the building by my department in return for a very greatly increased rental, for which, in my opinion, there was no justification. The opportunity having presented itself of acquiring equally suitable premises at the Richmond Hill Hospital from the Army Council free of rent, I found it possible to vacate the institution at Shepherd's Bush, and in all the circumstances I deemed it advisable to do so.

In answer to a later question, Mr. MACPHERSON stated that while the medical staff would naturally prefer to remain in a building associated with so unique a standard of surgical efficiency, the question of removal did not resolve itself into a purely medical one. He had no doubt that the transference of the staff and the equipment to Richmond would be in no way detrimental to the interests of the patients. He understood that the estimate of the cost of removal and adaptation was not likely to exceed one half year's rent that would have to be paid at Shepherd's Bush. There was no lease of the Richmond Park Hospital, but a two years' tenancy, rent free, was offered.

[In reply to a further question, Major TRYON stated that the equipment, provided at a cost of £16,000 by the Red Cross, would be moved from the present institution and installed elsewhere for the continued treatment of pensioners.]

Child Adoption.

Mr. NEVILLE CHAMBERLAIN asked the Secretary for the Home Department whether he had considered the recommendations of the Departmental Committee on Child Adoption, presided over by Sir Alfred Hopkinson, K.C.; and whether he proposed to introduce any legislation upon the subject in the course of the present session.—Mr. SHORTT replied: I hope a Bill may be introduced to give effect to the Committee's recommendation as to the legitimation of children by the subsequent marriage of their parents; but there appear to be very great difficulties in the way of carrying out the proposal for the legalisation of adoption.

Lunatic Asylum Administration.

Mr. ALFRED SHORT asked the Minister of Health whether, in view of the fact that the committee appointed to consider the administration of the lunatic asylums was predominantly representative of medical superintendents, the inefficiency of whose administration was the question to be inquired into, he would favourably consider strengthening the committee by the addition of representatives of the general public and of the Asylum Workers' Union.—Sir A. MOND replied: The hon. Member is under a misapprehension. The committee in question is appointed to consider charges made by Dr. Lomax and not the general question of asylum administration. Neither of the medical members of the committee has ever been associated with an asylum provided by a local authority. It would merely prolong the inquiry to add persons with no previous experience of asylum administration, and as regards the Asylum Workers' Union, while I regret their refusal to give evidence, I am unable to regard this as a reason for appointing to the committee a representative of a class directly incriminated by Dr. Lomax's charges.

Food and Milk for Expectant Mothers.

Lieut.-Col. ASSHETON POWNALL asked the Minister of Health whether he had yet come to a decision as to the policy to be pursued during the next financial year with reference to the supply by local authorities of food and milk to expectant and nursing mothers and young children, which was the subject of Circular 267 issued by his department in December last.—Sir A. MOND replied: The circular in question was in part the outcome of my desire to carry on the policy adopted by my predecessor of reducing the expenditure on the supply of milk to expectant and nursing mothers and young children which he found to be excessive. The circular also embodied medical advice as to the value of supplying meals instead of milk, which I received from my medical advisers and from outside persons of great authority. I have now received replies from most of the local authorities which are generally to the effect that they prefer to continue the supply of milk in view of the difficulty of arranging for the general supply of meals. I therefore propose to continue during the next financial year the arrangements at present in force for the supply of milk under proper safeguards against abuse, allowing local authorities to substitute meals for milk where they desire and are able to do so.

Trained Nurses and Unemployment.

Major BOYD-CARPENTER asked the Minister of Labour how many fully trained nurses for the sick, holding a three years' certificate of training, had registered at a labour exchange for unemployment benefit.—Dr. MACNAMARA replied: On Jan. 10th there were 701 women nurses on the Live Register as unemployed, but without inquiry at every exchange concerned it is not possible to say whether they held a three years' certificate or whether they were claiming benefit.

Nurses and Hospitals and Unemployment Contributions.

Colonel BURN asked the Minister of Labour if he would consider the advisability of relieving hospitals and the nursing staff from the application of the unemployment insurance contribution which entailed a considerable financial burden on hospitals, and prevented nurses from giving their services by reason of the large proportion of wages which had to be paid in respect of that tax. Major BOYD-CARPENTER asked the Minister of Labour if nurses employed in private nursing homes or associations were compelled to contribute to insurance funds and were not eligible for unemployed benefit when waiting for a case.—Dr. MACNAMARA replied: Nurses employed in hospitals or in private nursing homes or associations are liable to pay contributions under the Unemployment Insurance Acts, and I have no power to exclude them from the scope of insurance. The question whether benefit would be payable in any particular case would depend on the facts of that case, and would fall to be decided by the insurance officer with a right of appeal to the Court of Referees and the Umpire.

Life Pensioners and Medical Boards.

Mr. HOGGE asked the Minister of Pensions why it was possible for the Ministry to call a pensioner awarded a life pension before an examining board at any time, while the

life pensioner could not appeal inside any stipulated period against his award.—Mr. MACPHERSON replied: I am afraid that I am not clear what class of case my hon. friend has in mind. I may point out, however, that Article 5 of the Royal Warrant expressly allows of the review by the Ministry of a permanent pension where error has been made. A permanent pensioner, on the other hand, can appeal to the Ministry against his award on any ground, and even where a final award is made under the War Pensions Act, 1921, he has a right of appeal for a year after the award is made.

Ex-Service Men in County and Borough Asylums.

Captain LOSEBY asked the Minister of Pensions if ex-Service men in county and borough lunatic asylums were treated as private patients; and what was the average payment per head per week made by the Ministry of Pensions in respect of the exceptional privileges accorded them.—Mr. MACPHERSON replied: Certified patients, for the cost of whose maintenance and treatment the Ministry has accepted liability, are classified as "Service Patients," and are, by special arrangement with the Board of Control, received in asylums on the legal footing of private patients. The average weekly cost of a "Service Patient" is 30*s.* 9*d.* Of course, this amount does not include treatment allowances.

Maintenance of Mentally Affected Officers.

Captain LOSEBY asked the Minister of Pensions the average cost per head per week of officers mentally affected maintained in institutions conducted by the Ministry of Pensions, and the average payment per head per week paid in respect of officers detained in lunatic asylums.—Mr. MACPHERSON replied: I assume that my hon. and gallant friend desires to compare the cost of maintenance in lunatic asylums with that in the Ministry institutions for the treatment of officers suffering from neurasthenia and similar uncertifiable disorders, as there are no mental hospitals under my control. The average cost per head in such Ministry institutions is 87*s.* 6*d.* a week, as compared with an average payment of 89*s.* 10*d.* a week made by the Ministry in respect of officers in asylums.

Allowances for Home Treatment of Insane Soldiers.

Captain LOSEBY asked the Minister of Pensions if the next-of-kin of ex-Service men certified insane, who were willing and able to take charge of and provide adequate treatment for such ex-Service men in accordance with the Lunacy Laws, received from the Ministry of Pensions the same treatment allowances as were paid in respect of ex-Service men confined in lunatic asylums, and the number of cases, if any, in which such treatment allowances were paid in the year 1921.—Mr. MACPHERSON replied: An ex-Service man discharged from an asylum by the responsible authorities to the care of his relatives and in need of further treatment for a mental disability not certifiable but due to or aggravated by service, would be eligible for the usual allowances appropriate to home treatment. No separate record of such cases is kept, and I am therefore unable to give the information asked for in the last part of the question.

Economy and the Mental Deficiency Service.

Mr. LESLIE SCOTT asked the Minister of Health whether he had been able, in consultation with the Board of Control and the Treasury, to reconsider the position created by the circular of the Board of Control of August last in relation to the financial limitation upon local authorities in regard to dealing with urgent cases of mental deficiency: and, seeing that such limitation, if adhered to, would prevent large numbers of urgent cases from being dealt with under the Act, that it was objectionable in the interest of the defectives themselves, of their families, and of the public that such cases should be uncared for, and that the expense to the State in rates and taxes for police, justice, Poor-law, and other public services, was many times greater if such defectives were at large than their whose cost of maintenance if cared for under the Act, whether he would cause the circular in question to be withdrawn.—Sir A. MOND replied: In view of the economy which it should be possible to secure on the Mental Deficiency Service generally, I hope that local authorities can now make such provision as is essential to enable new urgent cases to be dealt with, and I am causing the Board of Control to issue a circular accordingly.

MONDAY, FEB. 20TH.

The Russian Famine.

Mr. GRATTAN DOYLE asked the Under-Secretary of State for Foreign Affairs if he was in a position to give reliable facts regarding the reported famine in Russia; how many people were affected in the stricken area; how many had died from starvation; and whether any of the food and money contributed by the allied nations had been diverted and used to feed the Bolshevist army, and to the upkeep of the Soviet government.—Sir P. LLOYD GREAME (Secretary of the Department of Overseas Trade) replied: I am unable to give any reliable figures in regard to the number of people affected by the famine in Russia or of those who have died of starvation. There can be no doubt, however, that the situation in some parts of the famine area is one of extreme gravity and that a population of many millions is affected. It is hoped that Sir Benjamin Robertson, who has just returned from a tour in the famine areas on behalf of the Russian Famine Relief Fund, will be able to give valuable information in his report on the extent of the disaster. As regards the last part of the question the answer is in the negative so far as contributions from British sources are concerned, and this also applies so far as H.M. Government are aware to contributions from other countries.

TUESDAY, FEB. 21ST.

Orderlies in Military Hospitals.

Mr. GODFREY LOCKER-LAMPSON asked the Minister of Pensions how many orderlies were employed in Ministry hospitals and whether there was one orderly for every six patients.—Mr. MACPHERSON replied: There are 1879 orderlies employed in Ministry hospitals and convalescent centres where there are 13,644 in-patients; but less than 50 per cent. of these are employed on nursing duties or in the wards. The remainder of the orderlies so termed are merely employees engaged on general domestic duties—e.g., as messengers, sanitary men, storemen, gatemen, dining-room orderlies, gardeners, and ambulance drivers, and in the out-patient departments where 17,861 patients are being treated.

London Drunkenness Statistics.

Sir R. HALL asked the Home Secretary the number of convictions for drunkenness in the metropolitan police area in the years 1913, 1920, and 1921.—Mr SHORTT replied: The figures are as follows: 1913, 64,783; 1914, 67,117; 1915, 51,372; 1916, 29,095; 1917, 16,567; 1918, 9901; 1919, 20,674; 1920, 29,956; 1921, 27,410 (Jan.–June 12th, 736; July–Dec. 14th, 674).

Medical News.

UNIVERSITY OF BRISTOL.—At examinations held recently the following candidates were successful:—

EXAMINATION FOR DEGREE OF CH.M.

Gynæcology.—Reginald S. S. Statham.
Laryngology.—Eric Watson-Williams.

FINAL EXAMINATION FOR DEGREES OF M.B., CH.B.

Percy Phillips (first-class honours), Macdonald Critchley (second-class honours), and William K. A. Richards.
Part II. (*completing examination*).—Phyllis Beames, Madge E. Golding, William A. Jackman, Winifred G. Nott, and Victoria S. Tryon.
Part I. (*including Forensic Medicine and Toxicology*).—Bertram A. Crook, John M. Evans, Constance L. Griffiths, Francis J. Hector, Marguerite G. Hughes, Frances M. Jones, Arthur J. Keevill, Eric C. K. Kenderdine, Doris M. Pullen, James A. L. Roberts, and Harry L. Shepherd.
Part I. only.—Francis H. Bodman, Carrie H. Osmond, and Hugh J. H. Spreadbury.

EXAMINATION FOR DIPLOMA IN PUBLIC HEALTH.

Part I. only.—Bernard A. Astley-Weston.

FINAL EXAMINATION FOR DIPLOMA IN DENTAL SURGERY.

William Bayly and Leslie C. Bodey.

FINAL EXAMINATION FOR DEGREE OF B.D.S.

George N. Season.

PSYCHOLOGICAL MEDICINE AND JUVENILE CRIME.—Presiding at a lecture on the Mind and What We Ought to Know About It, given under the auspices of the People's League of Health by Dr. R. S. Rows at the Royal Society of Arts on Feb. 20th, the subject being the Association of Ideas, Recognition and Memory, Mr. Clarke Hall, the Old Street police court magistrate, whose work is largely connected with juvenile delinquency, said that such a campaign as that organised by the League was of importance in educating and drawing together voluntary workers at a time of economic difficulty. The work of the League stood pre-eminently for human happiness, of which the principal component was health, and the great means of promoting health was knowledge. Through ignorance of treatment, through want of a better scientific knowledge or system, children drifted at an early age into crime, to become eventually habitual criminals. As president of a Children's Court in the East End of London, he was certain that the best means of dealing with infantile delinquency was to spread knowledge of what was happening to those children, and to point to how much the individual worker could do.

ROYAL INSTITUTION OF GREAT BRITAIN.—The Friday evening discourse on March 3rd, at 9 P.M., will be delivered by Dr. C. Morley Wenyon on Microscopic Parasites and their Carriers. On Feb. 28th, at 3 P.M., Sir Arthur Keith, F.R.S., will give his second lecture on Racial Problems in Asia and Australasia. On March 2nd, at 3 P.M., Mr. H. Maxwell Lefroy will lecture on the Menace of the Insect Pest. On March 4th, at 3 P.M., Sir Ernest Rutherford, F.R.S., will give his first lecture on Radio-activity.

SOUTH-WESTERN OPHTHALMOLOGICAL SOCIETY.—This society met on Feb. 14th at the Bristol Eye Hospital. After a series of interesting cases had been shown and discussed, Mr. Leighton Davies (Cardiff) opened a discussion on corneal ulcers, their clinical varieties and treatment. A joint meeting with the Midland Ophthalmological Society has been arranged, at the invitation of the latter, to be held at Birmingham in April.

THE LATE DR. GEORGE BANKS.—The death occurred on Feb. 9th at Wick of Dr. George Banks, medical officer of Wick burgh and parish, at the advanced age of 85. Dr. Banks qualified L.R.C.S. Edin. and L.M. in 1858 and took the L.R.C.P. Edin. by examination in 1860. He held numerous public appointments and was at one time chairman of the county division of the British Medical Association. Two years ago he was entertained by the Association on completion of 60 years public service as a medical practitioner.

DONATIONS AND BEQUESTS.—The late Mr. William Austen Leigh, of Hartfield, Roehampton, has bequeathed £300 to St. Mary's Hospital, Paddington.—The Bolton Infirmary Committee has received £1000 from Mr. John Harwood to endow a cot to be named the Emma A. Harwood cot.—By the will of the late Dr. Andrew Alexander Brockatt the testator left £500 to the Hospital for Sick Children, Great Ormond-street, and £100 to the Malvern Hospital.

THE LATE DR. T. C. HYND.—Dr. T. C. Hynd died suddenly on Feb. 9th at Peterhead at the age of 49. During the epidemic of influenza in Peterhead and district Dr. Hynd had been working to the limit of his strength, and when he was himself attacked he succumbed to heart failure. Dr. Hynd was a son of the late Mr. Thomas Hynd, of Aberdeen, and he graduated M.B., Ch.B. at his native university in 1899. On qualification he joined Dr. J. Stephen in practice in Peterhead, and on Dr. Stephen's retirement he carried on the large practice single-handed.

THE LATE DR. DUNCAN CARMICHAEL.—Dr. Duncan Carmichael, who died of an attack of influenza at the age of 67, on Feb. 7th, at Boddam, Aberdeenshire, was well known as a pioneer of ambulance and sick-nursing work in the north of Scotland. A native of Paisley, he was educated at Glasgow and Edinburgh, graduating M.B., C.M. at the latter university with honours in 1877. After some years of private practice in Glasgow, he was appointed medical officer of the Blackhill Quarries, and from this time to his death resided at Boddam. Quarry work leads to a large number of minor casualties, and for 40 years Dr. Carmichael devoted himself to ambulance work, and more than 15,000 pupils passed through his hands at the Peterhead centre. During the war Dr. Carmichael was medical officer of the Peterhead Auxiliary Red Cross Hospital and commandant of the Women's V.A.D., Aberdeen, as well as medical officer of the German prisoners of war camp at Boddam. These various activities overtaxed his strength, and when the war was over he had a severe breakdown. A widow and two sons and two daughters survive him.

SUSSEX THROAT AND EAR HOSPITAL.—Despite the exercise of the greatest economy, the receipt of £774 from patients towards the cost of their treatment and maintenance, and nearly £500 from entertainments, the Sussex Throat and Ear Hospital at Brighton concluded the year 1921 with a deficiency of £724. The annual report states that unless more funds can be obtained the governors will reluctantly be compelled to curtail the advantages hitherto afforded by the hospital. The financial difficulties have for the moment been overcome by a legacy of £1500 under the will of Miss Anne Hall, formerly of Hove. The demands upon the institution increase every year. In 1918 the number of in-patients was 469, in 1919 it was 403, in 1920 608, and in 1921 695; while the out-patients have correspondingly increased, many coming from distant parts of the county. During the past year Sir Milsom Rees and Sir James Dundas-Grant have been added to the list of honorary consulting surgeons. Arrangements have been completed with the East Sussex educational authorities for the treatment of school-children in throat and ear cases, and also with the Brighton authority for the care of certain serious cases in children. The treatment of pensioners is also being successfully continued, and small fees are being paid by the authorities to the medical staff and to the hospital.

THE Postmaster-General announces an opportunity for the dispatch of letter mails, but not parcels, to Tristan da Cunha, via Cape Town. Letters, printed papers, &c., should reach the G.P.O., London, not later than the evening of March 2nd.

LORD MAYOR TRELOAR CRIPPLES HOSPITAL.—Dr. Leonard Hill, F.R.S., will lecture at the Wigmore Hall on Tuesday, March 7th, at 3 o'clock, on the Prevention and Cure of Tuberculosis. The lecture will be illustrated with lantern slides, showing methods of the new artificial sunshine and sea-bathing treatment. A limited number of free seats are available for those interested in the subject. Early application should be made to Mr. H. B. Harper, 61, Moorgate, London, E.C. 2.

Punjab University has conferred a Fellowship upon Dr. Edith M. Brown, of the Women's Christian Medical College at Ludhiana, Punjab, who has been a pioneer in the medical training of Christian women in India. The North India School of Medicine was opened at Ludhiana in 1894 with four students and two compounders, and with Dr. Edith Brown as principal. The school soon became recognised by the Government as a teaching institution, and in 1911 the girls from the Lahore Medical College were transferred to Ludhiana. The staff now includes nine doctors, five sisters, and six assistant doctors, with a total of nearly 150 students.

THE KING'S SERVICES CHOIRS.—On Feb. 11th the King's Services Choirs—consisting of ex-service men from the various hospitals where neurasthenics, mainly sufferers from "shell-shock," are treated—gave a performance in the hall of the Chelsea Polytechnic. Those members of the audience who had been present at the earlier meetings were struck with the progress made in the singing, particularly with the extraordinary advance in general stability of demeanour and power of concentration. These choirs are organised, trained, and maintained by the Vocal Therapy Society, whose beneficial influence deserves generous support. Reports can be obtained from the Secretary at 27, Grosvenor-place, London, S.W. 1.

STAFFING OF A POOR-LAW INFIRMARY.—The subject of the understaffing of Poor-law infirmaries has been brought prominently into notice by a recent inquest held in Norwich on a man who died at the workhouse infirmary in that city on Jan. 31st after amputation of his leg for malignant disease. The brother of the deceased man, while acknowledging that everything had been done for his brother's comfort in the institution, made a complaint to the coroner, in the interests of working people, that although the patient had been in the infirmary for a fortnight, his friends had only been informed of his serious condition three hours before the operation. Dr. Isaac Bernard Barclay, resident medical officer of the infirmary, stated in his evidence at the inquest that the operation of amputation of the leg was performed successfully, and that when he left the patient the latter's condition was satisfactory, but that he died about half an hour later, the cause of death being, in his opinion, not shock, but probably loss of cardiac nervous control. He thought the patient should not have been left for at least an hour and a half after the operation, but that that was impossible owing to the inadequate number of nurses, to which he had frequently called the attention of the guardians. The clerk to the guardians informed the coroner that he did not agree that the nursing staff was insufficient, but the coroner declared that according to the evidence the infirmary was not sufficiently staffed with nurses for the number of patients. After a correspondence in the *Eastern Daily Press* between the chairman of the house committee of the Norwich board of guardians and Dr. Barclay, the house committee have drawn up a report on all the circumstances, which was presented to the board of guardians at their meeting on Feb. 15th. The committee express themselves as satisfied that the present establishment of nurses is sufficient, but appear to have entirely lost sight of or disregarded Dr. Barclay's analysis of the duties of the staff, and to have assumed that all the nurses were engaged in purely nursing duties, a fact which can hardly be upheld in view of the medical officer's statements. The nursing sister was censured for leaving her patient within an hour of the operation, and the committee recommended the board to suspend Dr. Barclay immediately for the unexpired term of his service, and to rescind the resolution of Dec. 21st, 1921, allowing him six weeks leave with full pay and a grant of £50 towards removal expenses. A resolution to this effect was unanimously passed by the board. It appears that there has been for some time a considerable amount of friction between the board and their medical officer. Dr. Barclay has resigned his appointment by request of the board. In their report the committee expressed the opinion that his statements as to the shortage of nurses were prompted by a desire to discredit as much as possible the guardians' administration of the infirmary before leaving their service.

ST. ANDREW'S HOSPITAL, DOLLIS HILL—This hospital, which was opened in 1913 for patients able to pay, in whole or part, for medical and surgical treatment, had a deficit on the year's balance at the end of 1921 of £917, and a building debt of £515. In its ninth annual report, just issued, a special appeal is made for subscriptions in order that these debts may be cancelled, and for help in the maintenance, equipment, and endowment of the institution. Patients are admitted only on the recommendation of their own medical adviser. The hospital contains 45 beds; the daily average number of patients was 25, and 356 patients were admitted during 1921. The average cost of each patient per week was £4 8s. 8d. and the average stay of each patient in hospital a little over 26 days.

THE LATE DR. WILLIAM CRAIG.—Dr. Craig, a well-known pharmacologist, died recently within a few weeks of completing his ninetieth year. Born on March 28th, 1832, he first entered Glasgow University, where he graduated in Arts, and at Edinburgh University he graduated M.B., C.M. in 1868. Two years later he proceeded to the doctorate of medicine and became a Fellow of the Royal College of Surgeons of Edinburgh, of which body he had become a Member in 1868. Specialising in pharmacy and therapeutics, he was appointed lecturer on materia medica at the Medical College for Women, Edinburgh, examiner at the Royal College of Surgeons, Edinburgh, and lecturer on materia medica and therapeutics at Surgeons' Hall. He was an enthusiastic botanist and one of the oldest members of the Scottish Alpine Botanical Club and of the Botanical Society of Edinburgh. In recognition of his services to the latter society as secretary, one of the Sterculiaceæ was named after him. Dr. Craig, who was a Fellow of the Royal Society of Edinburgh, was the author of a Manual of Materia Medica and edited Milne's Materia Medica and Posological Tables.

ANNETT *v.* EVANS SONS LESCHER AND WEBB, LTD.—At Liverpool Assizes Dr. H. E. Annett, formerly Professor of Comparative Pathology in the University of Liverpool, and superintendent of the Runcorn research laboratories, was awarded damages of £225, being six months' salary in lieu of notice, against his former employers Messrs. Evans Sons Lescher and Webb, Ltd., for unlawful dismissal. Dr. Annett, who is medical officer of health for the Runcorn urban district council, was appointed by the above-mentioned firm of manufacturing chemists to be superintendent of their Runcorn research laboratories in 1911. Some months ago a foreman (who had been employed at the laboratories for about 18 years) was convicted on a charge of falsification of the time-sheets of workmen under his supervision and fraudulent misappropriation of wages, over a period of several months. Defendants alleged that Dr. Annett, as superintendent, was responsible for failing to discover the foreman's offence, that he did not make sufficient inquiry when the facts had been brought to his notice, and that when the firm gave instructions for application for a warrant for the man's arrest Dr. Annett advised the secretary to let the matter drop. At the time Dr. Annett was ill and an inmate of the Royal Infirmary, Liverpool. In evidence he denied the allegations, and stated that he sent a message to the director of the firm recommending that the matter be allowed to stand over until his return to duty, when he would make full inquiry. Immediately after the conviction of the foreman Dr. Annett was summarily dismissed by the firm. Mr. Justice Branson, in summing up, stated that Dr. Annett did no more than any reasonable-minded and just man would have done. He thought it was plain that Dr. Annett had acted in no sense disloyally to his employers. In his opinion the defence had not been made out. He therefore gave judgment for the plaintiff with costs.

INDEX TO "THE LANCET," VOL. II., 1921.

THE Index and Title-page to Vol. II., 1921, which was completed with the issue of Dec. 31st, is now ready. A copy will be sent gratis to subscribers on receipt of a post-card addressed to the Manager of THE LANCET, 1, Bedford-street, Strand, W.C. 2.

Appointments.

HILL, SUSIE E., M.D., B.S. Lond., has been appointed Assistant Medical Officer in Charge of the Brockley Maternity Home.

JENNER, A. G., M.R.C.S., L.R.C.P. Lond., Medical Officer of Health for the County Borough of Stockport.

PICKUP, A. McL., M.R.C.S., L.R.C.P. Lond., Honorary Assistant Anæsthetist to the Italian Hospital.

SCRASE, J. J., M.R.C.S., L.R.C.P. Lond., Certifying Surgeon under the Factory and Workshop Acts for Newton Abbot.

Vacancies.

For further information refer to the advertisement columns.

Aberdeen University and North of Scotland College of Agriculture.—Biochemist. £700.

Bethlem Royal Hospital, Lambeth-road, S.E.—Dent. Surg. £200.

Birmingham General Hospital.—Res. Anæsth. and Obstet. H.S. Each £100.

Bradford Royal Infirmary.—Two H.S.'s. £200.

Brighton, Royal Sussex County Hospital.—Hon. S., Asst. Surg. and Surg. Clin. A.

Bristol General Hospital.—H.P.'s, H.S., Cas. H.S., Obstet. O. and H.S. to Spec. Depts. Each £150.

Bristol Royal Infirmary.—Cas. H.S. £120.

Cardiff, King Edward VII. Welsh National Memorial Association.—Tuberc. Phys. £500. Asst. Tuberc. P.'s. £300.

Chesterfield and North Derbyshire Royal Hospital.—Res. Surg. O. £250.

Chester Royal Infirmary.—Two Hon. A.P.'s. Also Hon. Asst. Ophth. Surg. Asst. H.S. £150.

City of London Hospital for Diseases of Chest, Victoria Park, E.—H.P. £125.

Dartford, Kent, Darenth Training Colony.—Sen. and Jun. A.M.O.'s. £525 and £422 respectively.

Durham County and Sunderland Eye Infirmary.—Asst. S. £500.

Glasgow, Woodilee Mental Hospital, Lenzie.—Asst. M.O. £350.

Great Yarmouth Hospital.—H.S. £200.

Hospital for Sick Children, Great Ormond-street.—H.S. £100.

Islington Metropolitan Borough.—Asst. M.O.H. £500.

Liverpool Port.—Asst. Port M.O. £700.

Liverpool, Royal Children's Hospital.—Res. H.P.'s, Res. H.S.'s. £90 each.

London Temperance Hospital, Hampstead Road, N.W.—Asst. Surg.

Lowestoft, St. Luke's Hospital.—Asst. M.O. £478.

Manchester, Ancoats Hospital.—Anæsth. 10s. 6d. per attendance. Med. Reg. £100. H.P. £200.

Manchester, Baguley Sanatorium.—Third Asst. M.O. £300.

Manchester, Monsall Fever Hospital.—Third Med. Asst. £300.

Manchester, Salford Royal Hospital.—Res. Surg. O. £250. H.P. £200. Two H.S.'s and Cas. H.S. Each £150.

Middlesbrough, North Riding Infirmary.—Hon. Aurist.

Northampton General Hospital.—H.P. £200.

Nottingham General Hospital.—Res. Cas. O. £250.

Peckham House, Peckham, S.E.—Jun. Asst. M.O.

Preston, County Asylum, Whittingham.—Asst. M.O. £528 17s. 6d.

Queen Charlotte's Lying-in Hospital, Marylebone-road.—Asst. Res. M.O. £60.

Queen Mary's Hospital, Stratford.—H.P. £150.

Queen's Hospital for Children, Hackney-road, E.—Clin. Assts.

Royal Free Hospital, Gray's Inn-road.—Sen. Asst. to Path., &c. £500. Gynecol. Reg. £250.

Seamen's Hospital Society, Greenwich.—H.S. £150.

Sheffield Union Hospital.—Res. Asst. M.O. £250.

Singapore Municipality.—Asst. Health O. £910.

Stockport County Borough.—Asst. M.O.H. £600.

Stoke-on-Trent, North Staffordshire Infirmary.—Hon. Asst. Ophth. Surg. H.S. £200.

West Bromwich and District Hospital.—Res. A.H.S. £200.

West London Hospital, Hammersmith-road.—H.P. Two H.S.'s. Each £100.

Westminster Hospital, Broad Sanctuary, S.W.—Dent. S.

Births, Marriages, and Deaths.

BIRTHS.

CANE.—On Feb. 13th, at "Homewood," Peterston-super-Ely, Glamorganshire, the wife of Maurice H. Cane, of a daughter.

NICOL.—On Feb. 9th, at Constantinople, to Mary (*née* Murray), M.B., Ch.B. St. And., the wife of Major Nicol—a daughter.

MARRIAGES.

FORSYTH—BARNEY.—On Feb. 8th, at Alderney, John Andrew Cairns Forsyth, M.Sc., M.B., F.R.C.S., to Phyllis Honor, daughter of the Rev. John Le Brun and Mrs. Le Brun, The Rectory, Alderney, and widow of the late Lieutenant M. Middleton Barney, R.E.

DEATHS.

DRAGE.—On Feb. 16th, at Rodd Court, Presteigne, of heart failure, Charles Drage, in his 98th year.

PINKERTON.—On Feb. 18th, at Hastings, suddenly, from heart failure, Charles Pinkerton, M.D., of Queen's-road, Southport, aged 64 years.

WRAY.—On Feb. 13th, at a nursing home, London, Charles Wray, F.R.C.S. Eng., aged 63 years.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

Medical Diary.

Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.

SOCIETIES.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.

MEETINGS OF SECTIONS.

Monday, Feb. 27th.

ODONTOLOGY: at 8 P.M.
Clinical Evening:
Members are invited to show patients, models, slides, &c., and notice of such should be sent as soon as possible to Mr. Leonard Harwood, 90, Sloane-street, S.W. 1.
On this occasion the Library will be kept open until 10 P.M. for the convenience of members, and there will be a special display of odontological books and periodicals.

Tuesday, Feb. 28th.

MEDICINE: at 5.30 P.M.
Paper:
Dr. E. I. Spriggs and Mr. O. A. Marxer: A Review of 61 Cases seeking Relief after Short-circuiting Operations.
SURGERY:
ELECTRO-THERAPEUTICS:
Members of these Sections are cordially invited to take part in the discussion.

Wednesday, March 1st.

SURGERY: at 5.30 P.M.
Informal Discussion on the Treatment of the Acute Obstruction resulting from Carcinoma of the Colon.

Thursday, March 2nd.

OBSTETRICS AND GYNÆCOLOGY: at 8 P.M.
Short Communications:
Mr. Gordon Luker: A Wandering Silk Suture Removed from the Urethra as a Sequel to Cæsarean Section.
Dr. C. D. Lochrane: Decidual Reaction in Adenomyoma of Vaginal Wall.
Paper:
Dr. R. A. Gibbons: Sterility with Reference to the State.
EPIDEMIOLOGY AND STATE MEDICINE:
Members of this Section are cordially invited to attend the above meeting and to join in the discussion.

Friday, March 3rd.

LARYNGOLOGY: at 4.45 P.M. (Cases at 4 P.M.)
Discussion on the Treatment of Malignant Growths of the Nasal Accessory Sinuses.
Openers: Mr. E. Musgrave Woodman and Dr. Reginald Morton. Mr. Stuart-Low, Mr. O'Malley, Mr. Mollison, Mr. Norman Patterson, Mr. Harmer, Mr. Just, Mr. Wright, Mr. Howarth, and others will take part in the discussion.
Cases, specimens, slides, and photographs will be shown.
ANÆSTHETICS: at 8.30 P.M.
Annual General Meeting: Election of officers and council for 1922–23.
Paper:
Dr. Z. Mennell: Anæsthesia in Intracranial Surgery.

MEDICAL SOCIETY OF LONDON, 11, Chandos-street, Cavendish-square, W.
MONDAY, Feb. 27th.—8.30 P.M., Mr. G. Grey Turner will open a discussion on the Treatment of Tuberculous Glands. Followed by Sir Lenthal Cheatle, Mr. W. H. Clayton-Greene, Mr. Warwick James, and Mr. W. G. Howarth.

TUBERCULOSIS SOCIETY, Margaret-street Hospital, W. 1.
MONDAY, Feb. 27th.—7.30 P.M., General Meeting. Dr. Hernaman-Johnson: X Ray Apparatus Demonstration.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

WEST LONDON POST-GRADUATE COLLEGE, West London Hospital, Hammersmith-road, W.
MONDAY, Feb. 27th.—5 P.M., Mr. Bishop Harman: Latent and Paralytic Squint.
TUESDAY.—5 P.M., Mr. Tyrrell Gray: Intestinal Obstruction.
WEDNESDAY, March 1st.—5 P.M., Mr. Donald Armour: Practical Surgery.
THURSDAY.—5 P.M., Col. L. W. Harrison: The Modern Treatment of Syphilis. (Open to all Medical Practitioners.)
FRIDAY.—5 P.M., Dr. Owen: Management of the Premature and Delicate Infant at Birth.
SATURDAY.—10 A.M., Dr. Burnford (Medical Wards).
Daily:—10 A.M., Visit of Post-Graduates to Wards. 2 P.M., In-patients, Out-patients, Clinics, and Operations.

SOUTH-WEST LONDON POST-GRADUATE ASSOCIATION, St. James' Municipal Hospital, Ouseley-road, Balham.
FRIDAY, March 3rd.—4 P.M., Mr. J. Swift Joly: Retention of Urine in Elderly Men.

NORTH-EAST LONDON POST-GRADUATE COLLEGE, Prince of Wales's General Hospital, Tottenham, N. 15.
MONDAY, Feb. 27th.—3.30 P.M., Dr. L. Yealland: Examination of the Nervous System.
WEDNESDAY, March 1st.—4.30 P.M., Mr. Norman Fleming: External Eye Diseases.
FRIDAY.—4.30 P.M., Dr. S. C. Shanks: Electrical Reactions of Muscle and Nerve.
Daily:—2.30 P.M., In-patient and Out-patient Clinics, Operations, &c.

NATIONAL HOSPITAL FOR DISEASES OF THE HEART POST-GRADUATE COURSE, Westmoreland-street, Marylebone, W.
MONDAY, Feb. 27th.—5.30 P.M., Sir S. Russell-Wells: The Failing Heart.
Daily:—10 A.M. and 2 P.M., Out-patients and In-patients.

NATIONAL HOSPITAL FOR THE PARALYSED AND EPILEPTIC POST-GRADUATE COURSES, Queen-square.
MONDAY, Feb. 27th.—12 noon, Dr. Greenfield: Syphilis of the Nervous System. 2 P.M., Dr. Hinds Howell: Out-patient Clinic. 3.30 P.M., Dr. Russell Reynolds: X-Ray Demonstrations.
TUESDAY.—2 P.M., Dr. Grainger Stewart: Out-patient Clinic. 3.30 P.M., Mr. Armour: Surgical Treatment of Spinal Tumours.
THURSDAY, March 2nd.—2 P.M., Dr Kinnier Wilson: Out-patient Clinic. 3.30 P.M., Dr. Hinds Howell, Neuroses.
FRIDAY.—2 P.M., Dr. Gordon Holmes: Out-patient Clinic. 3.30 P.M., Dr. Adie: Intracranial Tumours (1).

HOSPITAL FOR SICK CHILDREN, Great Ormond-street.
THURSDAY, March 2nd.—4 P.M., Dr. Gray: Demonstration of Cases of Skin Diseases.

ST. JOHN'S HOSPITAL, 49, Leicester-square, W.C.
THURSDAY, March 2nd.—6 P.M., Chesterfield Lecture: Dr. W. Griffith: The Treatment of Skin Diseases.

CANCER HOSPITAL, Fulham-road, S.W.
TUESDAY, Feb. 28th.—4 P.M., Mr. R. H. J. Swan: Hæmaturia.
FRIDAY, March 3rd.—4 P.M., Mr. C. E. S. Phillips: Some Problems of Radio-Physics.

ST. MARYLEBONE GENERAL DISPENSARY, 77, Welbeck-street, Cavendish-square, W.
Post-Graduate Course on Infant and Child Welfare.
WEDNESDAY, March 1st.—6 P.M., Dr. Eric Pritchard: The Management of Difficult Cases.
FRIDAY.—Treatment of Minor Ailments.

BRITISH MEDICAL ASSOCIATION (CHESTERFIELD BRANCH) POST-GRADUATE COURSES.
FRIDAY, March 3rd.—(At Chesterfield Royal Hospital Board Room) 2.30 P.M., Mr. Simpson: Infections of the Kidney. 3.15 P.M., Dr. Mould: Prognosis in Mental Disease.

MANCHESTER ROYAL INFIRMARY POST-GRADUATE CLINIC.
TUESDAY, Feb. 28th.—4.30 P.M., Sir William Milligan: Early Diagnosis and Treatment of Laryngeal Cancer.

MANCHESTER BABIES' HOSPITAL POST-GRADUATE LECTURE, Slade-lane, Manchester.
SATURDAY, March 4th.—4 P.M., Dr. Dyson: Congenital Syphilis.

MANCHESTER FRENCH HOSPITAL, POST-GRADUATE LECTURES, 24, Acomb-street, Whitworth Park.
THURSDAY, March 2nd.—4.30 P.M., Dr. A. C. Magian: Difficult Labour.

ST. MARY'S HOSPITALS POST-GRADUATE LECTURE, Whitworth-street West Branch, Manchester.
FRIDAY, March 3rd.—4.30 P.M., Dr. Dougal: Labour in Contracted Pelvis.

ANCOATS HOSPITAL.
THURSDAY, March 2nd.—4.30 P.M., Dr. Renshaw: Systematic Examination of a Patient Suffering from Toxæmic Condition.

ROYAL INSTITUTE OF PUBLIC HEALTH, 37, Russell-square, W.
Lectures on Tuberculosis and Public Health.
WEDNESDAY, March 1st.—4 P.M., Dr. C. E. M. Jones: Surgical Tuberculosis in Children.

ROYAL SOCIETY OF ARTS, John-street, London, W.C. 2.
MONDAY, Feb. 27th.—8 P.M., Prof. A. F. C. Pollard: Cantor Lecture II., The Mechanical Design of Scientific Instruments.

PEOPLE'S LEAGUE OF HEALTH, Royal Society of Arts, John-street, London, W.C. 2.
Course of Lectures on the Mind and What We Ought to Know About It.
MONDAY, Feb. 27th.—6 P.M., Sir Maurice Craig: Habit, Adaptation.

THE LANCET: SUBSCRIPTION RATES.

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CAUSE, CONDITION, AND CONSTELLATION IN MEDICINE.

BY H. A. BOSMA, M.D.
HAREN (GRONINGEN, HOLLAND).

PHYSICIANS, since the dawn of medicine, have theorised concerning the origin of disease. Hippocrates (459–377 B.C.) included geographical place, climate, seasons, and bad habits of life in his consideration; he thought some diseases dependent on and others independent of the human will, and took some note of epidemic influences. Galen, *the* authority throughout the Middle Ages, took a narrower view, believing external influences to be harmful only when acting on a morbid disposition—i.e., on a faulty combination of Hippocrates' four cardinal humors: blood, phlegm, yellow bile, and black bile. This doctrine prevailed for over a thousand years. Then Paracelsus (A.D. 1491–1541) advanced the new idea of heredity; the immediate causes of disease, according to him, however, were mere fabrications, called entia: entia astrorum, veneni, and so on.

Progress was made when the learned Fleming van Helmont (1578–1644) conceived a distinction between acute and chronic diseases; this idea was taken up and energetically advocated by the great Sydenham (1624–1689). According to Sydenham acute diseases were due to noxious environmental influences on the normal body; chronic diseases arose from defective humoral conditions, often produced by dietetic errors. Until the time of Sydenham epidemics were ascribed to weather and seasons; he, however, postulated unknown processes in the interior of the earth with subsequent depurification of the atmosphere. This doctrine gave birth to a series of conceptions, attributing epidemic diseases to cosmo-telluric influences in their broadest sense—conceptions often vague and obscure, but proving of use in later epidemiological investigation.

Bacterial "Explanation" of Disease.

When Pasteur demonstrated fermentation and putrefaction as processes dependent on living organisms, and when in 1863 Davaine discovered the bacillus of anthrax, immense strides forward in pathology had been made; medical enthusiasm rose to a climax when in 1882 Koch demonstrated in tuberculous tissue the constant presence of a specific microbe that, isolated, cultivated, and injected into an animal, again produced tuberculosis. Shortly afterwards followed the discoveries of the cholera vibrio and various organisms connected with some particular disease. These organisms were made to produce specific maladies, and it was generally assumed that many "causes" of hitherto obscure diseases had been found. It appeared a simple matter; a poisonous or poison-secreting organism fell on human soil, and the patient fell ill with this or that disease, according to which organism had invaded his blood or tissues. Therapeutic measures were therefore directed towards destruction of those organisms in wounds, and exclusion of them from wounds. The surgical effects were striking, and there followed the rapid growth of bacteriology as a science, the discovery of disinfectants, the rise of personal and public hygiene, and bacteriophobia among doctors and readers of popular science. Enthusiasm soon waned, however, when new facts were established—when, for example, it was found that at least 90 per cent. of mankind must at one time or other be the host of Koch's bacillus, that only a comparatively small percentage contract tuberculosis in the clinical sense, and that perfectly healthy men may harbour the pneumococcus, typhoid bacillus, meningococcus, *Amœba histolytica*. We may, in fact, according to some authorities, be walking museums of pathogenic organisms, auto-infection being a frequent occurrence. Questions cropped up which found no answer in the dogma of bacterial causation of disease. Hardly anyone escapes a first attack of measles when brought into contact with the virus; why is this not the case with scarlet fever and diphtheria? Why are the chances, numerically expressed, of contracting measles 95, scarlet fever 40, diphtheria 15? (Gottstein). Why do some persons suffer from repeated attacks of erysipelas or pneumonia, whereas most people in similar circumstances remain exempt from these diseases throughout their lives? These and similar facts led to a reaction; the simple horticultural fact was recalled that seeds do not grow on every soil. Attention began to be transferred from *le grain* to *le terrain* and focused once more on factors inherent in the body; words much used in the pre-bacteriological era—constitution, disposition, diathesis—began to reappear.

Constitutional Explanation of Disease.

Martius, the well-known pathologist of Rostock, observed that the "cause" of lobar pneumonia was not the pneumococcus, but the lung, "the indispensable specific qualities of the lung tissue." The pneumococcus is "das auslösende Moment," the releasing moment; cold, trauma, and alcoholism are variable, not necessary, conditions. Now, judging from a number of recent and voluminous German publications on "constitutional pathology," the pathological pendulum seems to be rapidly swinging from the bacteriological to the constitutional extreme, and the practitioner may be in danger of losing balance in a fresh direction. One-sidedness is necessary for the research worker, who must temporarily contract his field of vision; but the practitioner should always consider a problem from various angles. Too often he is led astray by notable results obtained in some branch of special research; to-day he practises specific injections, to-morrow he defends non-specific treatment, and, having read an enthusiastic book on endocrine glands, he feels sure opotherapy is *the* thing.

The Conception of Cause.

Behind this mental oscillation I believe there often lies a muddled and indefinite conception of "cause." In daily conversation we frequently use the word "cause," meaning thereby the event, the force, the thing that acts, operates, produces an effect. My car suddenly refuses to start and, after a long search, I detect a particle of dirt as the cause. A man with an inflamed eye comes to my office; I remove a piece of cinder and cure his conjunctivitis by removing the cause. By "cause" in every-day language we mean some simple, very conspicuous one-one relation; everyone understands the term, it answers the purpose, and we ask no more. But we medical men then proceed to apply this very simple conception of cause to the most intricate and complex happenings in the psycho-physico-chemical cauldron that is man. We say we know "the cause" of tuberculosis, of syphilis, of typhoid, but not yet that of diabetes, of arteriosclerosis, of dementia præcox, and of cancer—although we feel sure that future research will result in the discovery of the causes of these diseases. Again, we are by habit of mind inclined to picture *one particular agent* at all times and everywhere and without exception responsible for the mischief. Now, as Goblot says, the notion of "cause" is, after all, "*obscure et multivoque*." "In metaphysics," Houssay remarks, "causality is a notion so clear that it is considered primordial, so that it has been made a principle, serving as the basis for important deductions. *In pure science, such is far from being the case.*" And Bertrand Russell, England's eminent philosopher-mathematician, digging deeper—whose remarkable address "On the Notion of Cause" before the Aristotelian Society in 1912, stimulated me to write this article—tells us that there are no causes at all and "that the law of causation, like much that passes muster among philosophers, is a relic of a bygone age, surviving because it is erroneously supposed to do no harm." As I believe that his essay may be profitably read by those who are neither philosophers nor mathematicians, but like most of us, trudgers in the rut of daily practice, I will string together from Russell's article a few passages that, to my mind, give the quintessence of his address, italicising those sentences which have a bearing on problems that concern us.

"Since there are no infinitesimal time-intervals, there must be some finite lapse of time between cause and effect. However short we make the interval, something may happen during this interval which prevents the expected result. In order to be sure of the expected effect, we must know that there is nothing in the environment to interfere with it. But this means that the supposed cause *is not by itself* adequate to insure the effect. As soon as we include the environment, the probability of repetition becomes almost nil." Nevertheless, Russell admits that fairly dependable regularities of sequence occur in daily life. What he denies is that "Science assumes the existence of invariable uniformities of sequence of this kind or that it aims at discovering them. Every advance in a science takes us further away from the crude uniformities which are first observed, into *greater differentiation of antecedent and consequent* and into a *continually wider circle of antecedents, recognised as relevant.* The principle 'same cause, same effect,' which philosophers imagine to be vital to science, is utterly otiose. If there are causes at all, they must be separated by a finite interval of time from their effects, and thus cause their effects after they have ceased to exist. Such laws of probable sequence, though useful in daily life and in the infancy of a science, tend to be displaced by quite different laws as soon as a science is successful. In the motion of mutually gravitating bodies there is nothing that can be called a cause and nothing that can be called an effect; there is merely a formula. There is no question of repetition of the same cause producing the same effect. It is not in any sameness of causes and effects that the constancy of scientific laws consists, but in *sameness of relation. Sameness of*

differential equations is the only correct phrase. Instead of stating that one event A is always followed by another event B, scientific laws state *functional relations* between certain events at certain times, which we call determinants, and other events at earlier or later times or at the same time. A system with one set of determinants may very likely have other sets of quite different kind, for example, *a mechanically determined system may also be teleologically or volitionally determined.*"

From Russell's writing certain corollaries may be deduced —for instance, that it is not unscientific for a physiologist or experimental pathologist in his researches to be guided by teleological preconceptions, and, although the practice of medicine is by no means mathematics, the practitioner should, like the research worker, assume the habit of thinking by preference in mathematical terms, as illustrated by a sentence, used by Herderschee, with reference to infectious diseases, which he says are "a function of two variable quantities, the virus and man," although of the "two" I am not so certain. We should never lose sight of the fundamentals taught by Claude Bernard who, in an immortal book, is never tired of impressing upon his readers that all that can be done is to determine conditions under which a phenomenon appears. No doubt we shall use the word "cause" until the crack of doom, but it is well to be reminded that there are different conditions necessary for a change to be produced, in such a manner that this change invariably arises, as soon as *all* conditions are present and never arises when *one* of them is absent. Now, if we call the *total number* of these conditions "the cause" and each of them a cause or better still a "causal factor," we shall have a clearer notion of what is meant when we say we are searching for "the cause of cancer."

The "How" and the "Why."

All we can do in scientific medicine or in any branch of science whatsoever is to find out relations by discovering or determining conditions. By the most subtle analysis we only arrive at the mechanism of things—i.e., we can state the "how," which is not "by *what*" and still less "*why*." H and O under certain conditions—i.e., taken in definite proportions—give rise to the phenomenon water; this is *how*, but not why. Objects of a certain mass fall to the ground with a certain velocity, which we can express by a formula; the formula tells us *how*, but not why. An excised heart starts its contraction again when perfused with Ringer's fluid, containing various salts in definite proportions. Leave out K and it stops contracting, leave out Ca and it also stops contracting; the contractions reappear and are most powerful *under an ensemble of conditions*, but why, after all, does the heart contract? Even Zwaardemaker's recent discovery that the function of potassium in Ringer's fluid is exclusively dependent upon its radio-activity does not bring us any nearer to answering the question *why* the heart contracts. It has, however, provided us with a new condition, a condition of a condition, in itself important enough, because it has added a new factor in the mechanism of the heart's contraction that may perhaps some day lead to the elucidation of pathological disturbances and eventually influence therapeutic measures.

The student in one of Molière's plays, when asked by the professor why opium produces sleep, answers: "*Quia est in eo virtus dormitiva, cujus est natura sensus assoupire*"; the French satirist was ridiculing the ignorance of the doctors of his time, who did not even know why opium produced sleep. Now, a student of our day, versed in the latest lipoid chemistry, could give no better answer, though he might be able to tell his professor all that is known of the dynamics between opium and the lipoids of the brain. The same lack of distinction between the "how" and the "why" has caused many persons erroneously to speak of "the bankruptcy of science" on the ground that science has failed to give us "the essence of things." Those critics generally omit to tell us what they mean, for instance, by the "essence," say, of a table, and they forget that, as compared with 50 years ago, we actually know a good deal about conditions and relations, which alone constitute science. As for "causes" in the sense of agents that operate, produce effects, &c., they do not exist; a volition operates when what it wills takes place, but nothing can operate except a volition. "The belief that causes 'operate' results from assimilating them, consciously or unconsciously, to volition" (B. Russell). As Goblot remarks: Our conception of "cause" is, at bottom, anthropomorphic. In all experimental study of detailed phenomena we always deal with "conditions"; "it is not a single experience, nor even a science, but all sciences together that lead to the idea of causality" (F. Houssay). Cause in the sense of by *what* and *why* is beyond experiment; it belongs to the domain of metaphysics. And if experimental biologists, like Fréderic Houssay, are by a rigorous determinism led to assuming "a unique, universal, efficient, and final cause" that must be "in the nature of an Intelligence and a Will," then this Intelligence is "the essence of things" and constitutes the only answer to all *why's*. Though acceptance of such a cause, either as a religious intuition or as an ultra-scientific deduction may, no doubt, influence human action, it cannot help us in building up medical or any other science, which always aims and must aim at finding out relations by discovery and determination of conditions and conditions of conditions ad infinitum.

The Pathology of Constellations.

These lines were already written when I became acquainted with two recent publications in German of a distinguished compatriot of my own, Prof. N. P. Tendeloo, professor of pathology in the University of Leyden, who has worked out in great detail the idea I wanted to emphasise—the facts of our fallacies, due to a narrow, vague, and altogether too simplified notion of "cause" and our frequent neglect of considering an ensemble of conditions. In his "General Pathology," which displays much originality and critical sense, Prof. Tendeloo advances a new idea and a new word "constellation," and in a separate booklet has recently enlarged upon this theme. I will briefly state what the Leyden pathologist means by his "pathology of constellations." He opens his "General Pathology" with a statement of the meanings attached by him to such words as "cause" and "action," and then develops the necessity of a new idea in pathology: constellation. What are we in general to understand by a causal relation between phenomena? If we reduce the cosmos to energy, we may say that energy is made up of many small quantities, kinetic or potential in form. There is a continual change of form and (or) of distribution of energy. Every change in form or distribution of energy we call action. Every action means such a change. It depends on the realisation of definite conditions. The last indispensable condition is often called the "exciting cause" or in German the "releasing moment," &c. Inner cause would be the amount of energy, whose change in form and (or) distribution, is the "effect." Since in the living organism we often cannot determine this amount of energy—not even its character or its transformation—Tendeloo calls both the inner cause and the conditions necessary to produce an effect "causal factors" or simply "factors." An action is determined by a constellation of definite factors in a limited part of world-space—for instance, in a living organism and its influencing environment. If one factor should be missing or have another value, there is no "action" (effect) or another action (effect). Yet it is possible that some slight fluctuation in strength of a factor exists without our being aware of a difference in action. Another "action" means another constellation. Since in the constellation necessary for a certain action each factor is indispensable, we should always have in mind the whole constellation, and endeavour to determine all factors of the causal constellation, both as to quality and quantity. Not until we have split up the whole constellation into its factors do we know "the cause" and "the effect."

What are we to understand by a constellation? It is more than the sum-total of factors, required for a definite process; one factor may influence another or they may mutually influence one another, and this also is a part of the constellation. A factor has not always the same value, but rather a relative value, dependent on the constellation to which it belongs. For example, a person, clothed in a dry, permeable garment, sitting in dry air of high temperature will sweat profusely and lose a great deal of bodily heat by evaporation of sweat. Air of the same temperature, saturated with water vapour, renders evaporation of sweat impossible, so that retention of heat and even heat-stroke may result. Another example: Oxygen inhibits the growth of anaerobic bacteria; but if there should be in the culture-medium at the same time aerobic microbes, oxygen may be a benefit to the anaerobics in case the aerobic germs should produce substances that serve as nutrition for the anaerobes, though living in a soil with oxygen.

External and Internal Factors.

We may, for the sake of facilitating interchange of thought, distinguish a constellation of external and internal factors. Cosmo-telluric influences may be considered as an example of a constellation of external factors. We know that certain climates influence tuberculous patients favourably or unfavourably, that certain atmospheric conditions are followed by catarrhal affections; but different investigators make conflicting statements as to the significance of certain factors. All possible atmospheric and weather conditions have been assigned as the "cause" of bronchitis. No doubt it is possible that in a definite constellation or in various constellations various factors may lead to bronchitis. But we shall never get exactness unless we determine in our observations qualitatively and quantitatively the complete constellation of external and internal factors and then compare these constellations. We may then find out the factors common to both and those that are not; also the

factors that produce bronchitis and those that do not. Moreover, we should take into consideration the spatial and temporal arrangement of factors, since certain atmospheric factors influence one another—as, for instance, temperature, humidity, motion and electricity in the air, accumulation of radio-active substances, and emanation. Electricity, radio-activity, and radiation are factors of great importance. We should never be led astray by the conspicuousness of a single factor, but always attempt to determine the constellation.

Interaction of Factors.

There is another possibility: one factor may intensify another or there may be mutual intensification. For instance, refrigeration of the body in motion is greater by moist air than by dry air moving at the same rate, and we do not know in this case whether we have to deal with summation or addition only, partly with addition, or with intensification by vaso-motor or other action. Certain drugs, narcotics, for instance, have, when combined, a stronger effect than might be expected from simple addition of their separate actions (narcotin-lobelin). Other combinations seem to be followed by a weakened action. There is another factor that may be temporarily a part of a constellation—namely, the *status nascendi* of a substance formed in living tissues.

Now as to internal constellation. By organism we mean a morphologico-functional unity. The organs are functionally related, but as yet the functional relations between them are imperfectly known. A function of one particular organ may be disturbed by a faulty action of another organ. Thus, the quantity of urine may be diminished by defective cardiac action.

The qualities of the whole, be they normal or abnormal, form a constellation of factors which determine the efficiency and resistant power of the organism, its susceptibility to certain noxæ, and the material and psychic changes dependent thereon. The susceptibility of a tissue to a definite poison is determined not only by the chemical or physico-chemical affinity between definite parts of the organism and the poison, but also by factors which influence accumulation (concentration) in the tissue and its chemical or physico-chemical action. Such factors, are, for example, the kinetic energy of blood and lymph that course through the tissues or that govern the distribution (accumulation) of the poison, and the quantity of oxygen or other substances which further or inhibit the action of poison in the tissues. The same holds good for living organisms. In our search for the ætiology of disease we should not only determine the constellation of an organism as a whole, but also pay attention to the local constellation involved. Strychnine, as we all know, has a selective action on special cell groups of the nervous system. The degree of poisoning by strychnine depends on the amount of poison acting upon a certain part of the nervous system. How are we to calculate this quantity? Very simply, we say. Of course, by subtracting the quantity excreted from the quantity taken in by the air-passages or skin or introduced directly into the blood. Yet this simple arithmetic leads to error, since Almaria, Tizzoni, and Perruci have shown that strychnine is held in combination by cholesterin, perhaps adsorbed and rendered inactive by it. So that strychnine or part of the strychnine at least is held back by cholesterin. We also know that the quantity of cholesterin in the blood varies in different individuals and has its fluctuations in the same individual, so that the cholesterin content of the blood should be known. Ransom showed that cholesterin in the blood binds and renders inactive saponin: other observers found other poisons to be made inert in similar way. Boric acid and silicic acid produce hæmolysis only in the presence of lecithin; cholesterin, cerebron, and pepton intensify the action of pilocarpine. Furthermore, oxidation, reduction, and other changes of the poison may have occurred before it reaches the selective cells, so that a poison taken in by the mouth, or introduced into the circulation by some other way, or a deleterious substance, born in the tissues (*status nascendi*) may meet with a constellation of factors, capable of either decreasing its quantity or of furthering or inhibiting its action on special, sensitive cells. It is probable that the same holds good for the action of internal secretions, and our judgment as to their action should be very guarded. The possibility of an internal secretion being decomposed, held in combination, weakened, intensified or qualitatively changed should be thought of before assuming a hypo-, hyper-, or dys-function of an endocrine gland. The history of adrenalin may be a warning. It was held to be responsible for many pathological and physiological phenomena, and was then discovered to leave the body very quickly.

The ideas put forward by Tendeloo, a pathologist of great erudition and critical sense, should cause us, as practitioners, to be prudent in judgment; they illustrate magnificently Bertrand Russell's "continually wider circle of antecedents recognised as relevant," referred to above. The principle that disease is due to a constellation of factors must lead to practical considerations. It shows that any factor may become a point for attack by treatment, teaches the importance of synergistic remedies, and explains why the best and most successful practitioners often make use of rather complicated prescriptions. Indeed, according to our pathology of constellations, the simple prescription is not necessarily either most scientific or most efficient.

Conclusion.

Although we should always endeavour to determine the constellation, there may be unknown factors that escape us. Only 25 years have passed since radio-activity was discovered in nature, and it seems but yesterday that Zwaardemaker discovered that—in his own words—"the physiology of the animal potassium is the physiology of animal radio-activity"; both these discoveries are factors, no doubt, of importance and may open up new vistas into the ætiology of cancer. As those sciences progress upon which medicine is founded, new manifestations of energy are discovered which remind us of the risk of omitting in our constellation factors that might matter very much. I have already referred to Frédéric Houssay's belief in "psychic energy outside a nervous system," although he denies a direct proof of it. And what is to be said of a statement by a trained logician like Hyslop of New York, the secretary of the American Association for Psychical Research, who is, no doubt, the spokesman of other scientists: "I regard the existence of discarnate spirits as scientifically proved, and I no longer refer to the sceptic as having any right on the subject. Any man who does not accept the existence of discarnate spirits and the proofs of it, is either ignorant or a moral coward." This is forcible language from an experimentalist accustomed to caution in his expressions, but, assuming for a moment that these utterances are true, would "this psychic energy not correlated with a nervous system" fit into our pathology of constellations? Of course, no satisfactory answer to this question can be given, and I only put it and refer to yet unknown conditions to illustrate the fragmentary character and relativity of all medical science. When as practitioners we fail to determine the disease-producing constellation, we must revert to pure empiricism, remembering the trite saying that to the sick man all is medicine that works well.

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THE SURGERY OF THE BLOOD.

THE inaugural Robert Campbell Memorial Oration was delivered in the Medical Institute, Belfast, on Feb. 16th, by Colonel Thomas Sinclair, F.R.C.S., who gave an appreciative sketch of the life and work of the late Mr. Campbell, and then proceeded as follows:—

Cohnheim, he said, had regarded the blood as a tissue consisting of cells and a fluid intercellular substance. The blood was characterised by its marvellous capacity for maintaining a relative constancy or homogeneity of composition and structure. It showed the power of rapid restoration, after hæmorrhage, hæmolysis in fevers, and other distempers. It was tolerant of injections of many kinds—salt, soda, eusol, mercurials, gelatin, gum arabic, ether, alcohol, aniline dyes, homologous blood, vaccines, sera.

Hæmophilia and Clotting.

Hæmophilia was still obscure as regards its precise nature and causation. Hitherto the surgical rule had been to confine operations upon hæmophiliacs to those of primary surgical urgency. In the milder forms, however, after a few days of preparatory treatment by calcium salts, hæmoplastic serum, or repeated small transfusions of homologous blood at short intervals, operative measures might be undertaken. Pernicious anæmia was an unpromising field for the surgeon, but the latest results from the Mayo Clinic suggested that splenectomy might in certain cases prolong life for a period. Transfusions of blood had only a temporary result. In the treatment of severe hæmorrhage isotonic saline or 6 per cent. gum solution might be employed intravenously, or homologous blood might be used, if available, warm fluids being given by the mouth or the rectum. As to apparatus, there was a choice between the hydrostatic method, the multiple record syringe method, and the paraffin-lined Kimpton-Brown tube. Care must be taken not to use syphilitic, tubercular, or malarious blood.

It was difficult to prove that clotting of blood in varicose veins, and hæmorrhoids in apparently healthy persons, was an inflammatory process. Microbic activity could not usually be demonstrated in such cases. He was inclined to think

that pulmonary embolisms and infarctions were more frequent than formerly. American surgery favoured free movements after operations upon veins in order to promote a freer circulation of blood, no splints being applied, but he (the speaker) was convinced that embolism was commoner in the cases treated by early movement and activity, and he remained an advocate of prolonged rest in these cases. From the purely medical point of view the question arose: Should calcium salts be given to condense the clots which may be formed, or should citrates be given to render the blood less liable to clot? The latter seemed the safer plan. Electric ionisation over thrombotic areas appeared to do good, and to expedite the restoration of the disabled circulation in post-operative conditions.

Other Morbid Conditions of the Blood.

Polycythæmia vera probably depended on undue activity of the red bone-marrow. Splenectomy in this condition was a fatal mistake. The best treatment appeared to be radium applied to the long bones, or possibly the deep X ray therapy of the Erlangen school. Repeated small bleedings served to reduce the plethora in this condition. In Banti's disease splenectomy was useful if performed before cirrhotic changes in the liver had gone too far. It might be that a preliminary application of radium to the spleen reduced the risk of the operation. In spleno-medullary leukæmia splenectomy had a gloomy record, and medical treatment held the field. X rays and radium could be tried, and some good results had been obtained. Lymphatic leukæmia was even less promising for the surgeon, and the treatment must be left to the radiologists. In Hodgkin's disease the extirpation of clusters of glands which are very large, discrete, and not adherent through inflammatory changes was both feasible and useful. The fear of anæmia following ablation of the tonsils seemed to have little foundation. In hæmolytic jaundice splenectomy had a high curative value, and had also proved beneficial in purpura hæmorrhagica.

Uses of Bloodletting.

It was possible that at the present day there was too much reluctance to adopt bloodletting in certain cases. It was valuable in congestion of the lungs following immersion, in apoplexy with high temperature, in uræmia, and in polycythæmia vera. Artificial leucocytosis might prove of value in cases where the surgeon dreaded the onset of sepsis in abdominal operations. In skin-grafting it was necessary to determine if the bloods of donor and recipient were homologous.

In conclusion, Prof. Sinclair pleaded for a closer coöperation between physician and surgeon. Any sharp cleavage between the two branches of the medical art was both unphilosophic and unscientific. Any unnatural divorce between medicine and surgery should be condemned. Coöperation and "team-work" were of great importance.

APPLICATION OF HEAT AND COLD TO THE HANDS.

AT a meeting of the Royal Society on Feb. 16th Dr. Leonard Hill, F.R.S., read a paper with this title by himself, Miss D. Hargood-Ash and Dr. J. Argyll Campbell describing researches carried out at the National Institute for Medical Research, Hampstead. The substance of the paper, which was illustrated by charts, was as follows:—

The object of the inquiry was to find out how much heat can be gained or cold lost from the body by local cooling or warming of a small part—e.g., by cooling the hands in a stream of cold water, and by warming the feet in a hot foot-bath or with a foot-warmer. The lecturer suggested that to secure the stimulation of body metabolism by cool air of low vapour tension ventilating the clothed and naked parts of the skin, the general heating of rooms by hot water coils might be replaced by small heaters kept a few degrees above body temperature, locally applied to, and under the control of, each individual; electric heaters placed beneath the outer garments have already been used by airmen. It has been established that heating or cooling the hands can effectively heat or cool the whole body, and further experiments of a like nature were described.

Immersion of Hands in Cold Water.

In experiments, in which the hands were placed in cold water, the respiratory exchange was estimated by the Douglas-Haldane method of indirect calorimetry. A rise in body metabolism, too small to be termed definite, was generally obtained after immersion of both hands in cold water at 15° C. for about 30 minutes. The amount of heat lost from the hands to the water—on an average 20 kilocalories in 30 minutes—was evidently replaced by cutting down heat lost from other parts of the body; a greater loss of heat is therefore necessary before metabolism is affected.

The temperature of the skin over the median vein at its bifurcation on the front of the elbow, recorded by means of a flat coiled thermometer insulated from the air, fell several degrees in the above experiments.

In experiments to determine the amount of heat lost by the hand to the water, the hand was placed in a tin can containing a known volume of water, and a similar can of water was used as a control. When the temperature of the skin over the median vein was found to be constant, the hand was immersed in the water as far as the wrist-joint. The temperatures of the water-bath and the control were read immediately before the immersion of the hand; readings were taken and plotted of the skin temperature at the elbow, and of the bath and control temperatures every minute. The total rise of temperature of the bath was 1·9° C., of the control 0·5° C., the total rise due to the hand 1·4° C., and the total heat loss from the hand 8·4 kilocalories. The temperature of the skin over the median vein for the 20 minutes' immersion, and for the succeeding 20 minutes, was quite different from that of the skin around it and nearer the hand, showing that the temperature of the blood in the vein was the controlling factor, and not conduction by the skin from tissues affected by the changes in the hand. Pain in the hand—probably due to contraction of tissues—was intense during the first few minutes if the temperature of the water was below 14° C.; it disappeared probably because the fluids escaped up the arm from the contracted tissues in the hand, thus relieving pressure. Pain is known to raise metabolism. In these cold water experiments constant results could not be obtained from day to day for a given range of temperature, probably because so many bodily conditions—e.g., vascular—are variable.

Immersion of Hands in Hot Water.

In an experiment in which the hand was placed in hot water (43·2° C.), the heat gained by the hand in 20 minutes was 6 kilocalories; and the rate of gain, after it had become constant, was 0·120 kilocalories per minute. In these hot water experiments the fall of temperature in the water of the bath was considerably greater during the first minute or so after the hand was immersed, and it was hard to tell how long this effect, probably due to the heating up of the hand, lasted. If it was only temporary, and the heat gained depended only upon the temperature of the water, different experiments should have given curves parallel to each other over the same range of temperature, which they did not do.

To obtain more certain information on this point the hand was immersed in hot water as before, but the water, instead of being allowed to cool, was supplied with a constant amount of heat equal to that lost by the water; thus if heat absorbed by the hand at a given temperature proved to be constant, experiments could be repeated at different temperatures to obtain a curve. The heat absorbed was not found to be constant, however, similar variations being obtained as with cold water; varying bodily conditions were probably responsible.

The Hand in the Rays of the Sun.

Numerous experiments were also carried out with the flat coiled thermometer when the hand as far as the wrist was heated by the rays of the summer sun. The temperature of the skin over the median vein was increased several degrees after the hand had been exposed for a few minutes; the blood in the vein may have been heated in the hand by conduction from the skin, or by rays penetrating the skin and converted into heat in the blood. Sonne, who used thermo-electric couples to determine the effect of different rays from the sun, found that the visible rays penetrate the skin and locally heat up the blood; to this fact he attributed the value of the sun in heliotherapy. Dark heat rays were found to heat the surface of the skin to a much greater degree.

Summary.

Experiments showed that the amount of heating or cooling of the hands by water was large, but not constant, for a given range of temperature. Some indication of the degree of heating or cooling was obtained from the temperature of the skin over the median vein at the elbow; the thermometer was coiled and insulated from the air. From 20 to 25 kilocalories of heat lost from the hands in 30 minutes did not appreciably affect the body metabolism, although almost equal to it.

PUBLIC HEALTH IN EGYPT.

FROM the annual return of births, deaths, and infectious diseases in Egypt for 1920,[1] dealing with a population of 13,042,400, it appears that the birth-rate was 42·8 per 1000, compared with 38·3 in the previous year; and the death-rate 28·4, compared with 29·8. The increase in the birth-rate and decrease in death-rate were general throughout the country, in the large cities as well as the rural districts,

[1] Cairo Government Press, 1921.

with comparatively few exceptions. It may be noted that the births varied between 38·7 in November and 48·5 in March, while the death ratio was also lowest in November (23·9), and attained its maximum in June (35·3). From a statement of the deaths due to the most important diseases prevalent in the Governorates and chief towns (where presumably a trustworthy diagnosis is obtainable), it appears that the most fatal disease was gastro-enteritis of children, which caused 16,232 deaths, giving a ratio of 8·66 per 1000 (compared with 8·24 in 1919); next comes bronchitis with 3·71, compared with 3·88 in 1919; and then in order senility (3·11), pneumonia (1·63), pulmonary tuberculosis (1·29), and dysentery (0·81). Throughout the country generally the ratio of stillborn children was 11·8 per 1000 births; in the provinces of Beni Suef and El Minya in Upper Egypt it was 4·5 and 3·8 respectively; in Cairo it was 39·9, and in Alexandria 39·1.

Cairo City.

In the report of the medical officer of health for Cairo city for 1919[1] the estimated population is given as 761,525 (of whom 57,707 were non-Egyptians); but it is admitted that this cannot be considered very correct, on account of the 1917 census having been "considerably affected by the war and consequent displacement of the foreign population," and because "the nationality recorded in the registration of births and deaths is possibly incorrect in a large number of cases." The birth-rate is stated as 42·0 per 1000, as compared with 36·9 in 1918, and 40·7 for "the quinquennial period ending in 1919"; the variation in the different districts was very great, from 29·9 in Helwân (not including certain villages attached to the town for sanitary purposes, but statistically returned in the Giza Mudiriya) and 30·5 in Esbekiya district to 52·5 in Old Cairo and 53·7 in Bûlâq. The general death-rate for the city, corrected for non-residents, was 41·4, as compared with 49·4 in 1918, 35·8 in 1917, and 41·8 for "the quinquennial period ending with 1919." The difference in ratios between the various districts was even greater than in the birth-rates, varying from 23·7 in Helwân (excluding the adjacent villages) and 27·0 in the Esbekiya district (a well-to-do residential and business quarter) to 49·6 in Bûlâq and 53·4 in Old Cairo. The infantile mortality ratio (corrected for non-residents) was 238 per 1000 births, an improvement on 329 in 1918, 262 in 1917, and 287, the quinquennial average (1916–19); here also there were great variations in the different quarters of the city; in Old Cairo the ratio was 292 per 1000 births, and in Bab-el-Shariya 268; in Esbekiya 184 and in Helwân 166; even in the Muski district, in the very centre of the city, this ratio was not higher than 190.

Zymotic Disease.

As regards prevalence of zymotic disease, typhus fever caused 2629 deaths, giving a ratio of 3·34 per 1000, an increase on the high ratio (3·002) of the preceding year, and far beyond that of 1917, which was 0·495. The case mortality (54·5 per cent.) indicates the severity of the epidemic, being higher than in the two preceding years (53·1 and 48·4 per cent.). In the Darb-el-Ahmar district the death-rate was 5·648, and in Gamaliyeh 5·570 per 1000. Small-pox caused 494 deaths (0·628 per 1000); in 1917 and in 1918 the ratio had been only 0·006; in the Muski district the mortality was 1·382 per 1000. In the section on vaccination it is stated that 27,292 children were vaccinated (out of 31,974 births); in addition there were 98,183 secondary vaccinations of contacts, or persons applying voluntarily. The Weather Conditions are summarised in a table, which shows that the temperature was above normal from January to April and in October and November; the highest record was 38·7° C.= 70° F. for the week July 9th to 15th, being 5° F. above the normal. The rainfall was below the average; except for a heavy fall of an inch and a half in the middle of January and slight showers on three or four other days, there was practically no rain; but the relative humidity was nevertheless above normal for every week in the year except 12. This report is well illustrated by numerous tables and diagrams, but is neither signed nor dated. A plan of the city, showing the district areas, would be a useful addition.

[1] Cairo, Government Press, 1921.

PUBLIC HEALTH IN PENANG.

THE estimated population in 1920 of Georgetown (which lies in lat. 5° 24′ N. and is the capital of Penang, the most northern of the Straits Settlements) was 108,286, of whom 1103 were Europeans, 69,675 Chinese, and the remainder Indians, Malays, and Eurasians. The birth-rate was 30·67 per 1000, and the death-rate 32·82. In 1910 these ratios had been 18·39 and 36·08 respectively. For the Chinese, who form the bulk of the population, the birth ratio was 32·29; for the Indians, 24·39; and for the Europeans, 41·70. The corresponding death ratios were 34·10, 35·54, and 9·99. The infant mortality was 205 per 1000 births, a considerable improvement on that of the previous year (244·1), and on the decennial average, which was 260 per 1000. The chief causes of this mortality were intestinal and respiratory affections, debility, and tetanus. Among the Chinese the infant mortality was 211·1 per 1000 births, and among Indians 267·2; but of the 46 European children born during the year not one died. Among the population generally the chief causes of death during 1920 were phthisis, malaria, enteritis, and pneumonia. Dr. J. Stuart Rose, the municipal health officer,[1] draws attention to the fact that 600 out of the 677 fatal cases of phthisis occurred among residents in Penang for two years or more, and therefore the disease must have been acquired locally: "Our efforts to provide light and ventilation have been neutralised by the rooted objection of the people to the use of these excellent disinfectants. . . . The task of reducing native ignorance rests largely with the Government; the education question is in their hands; instruction in hygiene could be made compulsory in schools." There can be no doubt that this is the right attitude to be adopted by the responsible authority. Anti-mosquito work is carried out, in the way of clearing ditches, abolishing standing water, and cutting down rank vegetation. A body of 20 Tamil boys, under supervision of a sanitary sub-inspector, did excellent work in this direction. Posters have been displayed in the town and articles contributed to the local press, lectures given to school-children and school-teachers, and lantern-slides shown at the local kinema. During the year the hospital for infectious diseases was taken over by the municipality, but Dr. Rose considers that the site is inadequate, and that it cannot be satisfactorily drained. A more suitable site has been found, but has not yet been acquired. Dr. Rose also is of opinion that the districts are much too large for efficient supervision by the sanitary inspectors, who now have to deal with vaccination and birth registration, and it is to be hoped that this matter will receive consideration by the responsible authority.

[1] Annual Report for 1920, Penang, 1921.

SCIENTIFIC PIG-KEEPING.

To the Editor of THE LANCET.

SIR,—I have noticed in a recent issue of THE LANCET a letter on this subject from Dr. M. J. Rowlands. It is well known to-day that successful farmers have to absorb a considerable amount of scientific knowledge to succeed, and I think nothing in recent years has been followed with such keen interest as the medical reports on vitamins. Of course, those of us who have been conducting large and successful pig-farming enterprises for many years had already learned the necessity for green crops for growing pigs successfully and cheaply, and particularly the value of clovers, lucerne, and kindred plants. I wrote on this subject during the war, when milling offals and other foods containing essential elements for the rearing of young pigs were unobtainable, that I was able to raise pigs successfully on roots, greenstuff, palm kernel meal, and fish meal. At this time the medical and scientific reason was not as well known as it is to-day, but I can certainly confirm the utility that vitamin experiments have been to the farming community as they have crystallised into definite form that which was only known in a sort of indefinite way to most engaged in the business of agriculture.

I am, Sir, yours faithfully,

S. F. EDGE.

Gallops Homestead, Ditchling, Sussex, Feb. 14th, 1922.

APPARATUS FOR X RAY THERAPY.

THE introduction of the Erlangen X ray technique probably caught our makers of such appliances more or less unprepared, as the extra electrical tension employed called for a degree of insulation out of all proportion to the numerical difference in voltage. British makers now appear to be proving themselves equal to the situation. Messrs. Newton and Wright, Ltd., have made an apparatus in which two induction coils are joined in series and immersed in an oil-tank. The claim that this is the surest way of preventing a breakdown of the insulation has been substantiated by running for several hours daily over a period of many weeks. The oil-tank is hermetically sealed and can be sent about without emptying or dismantling. A rectifying interrupter is included within the oak cabinet containing the main parts of the apparatus, and the whole is controlled by a switch-table on large wheel castors that can be readily moved about the room. A good feature of the switch-table is that all live wires are below the surface. The apparatus can be adapted to continuous or alternating current up to 60 periods, and the makers are prepared to quote specially for higher periodicities, which present special technical difficulties.